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BIOMEDICAL AND BEHAVIORAL SCIENCES

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## AEROSPACE MEDICINE

### REMOTE MEDICAL DIAGNOSIS

Vilnius SOVETSKAYA LITVA in Russian 12 Apr 85 p 4

[Article by V.K. Yemel'yanov: "Outer Space for Man"]

[Text] At the request of our APN correspondent, Oleg Georgiyevich Gazeiko, director of the USSR Ministry of Public Health's Institute of Medical and Biological Problems, described the use of the achievements of space medicine to solve medical problems on Earth.

#### The Medicine of the Future

"Outer space aviation has enriched our knowledge not only about space and our planet but has also increased our knowledge of ourselves," said O.G. Gazeiko. "With every piloted space flight, there are advances in the methods used to protect and monitor the health of cosmonauts and we have multiplied what we know of man's abilities, methods of controlling the organism's adaptation to changing and often harsh conditions of outer space. Special methods and the proper apparatus allow us to record and transmit various physiological parameters that indicate the status of all of a cosmonaut's vitally important body systems. This makes it possible for medical specialists to know practically everything about the health of people in outer space."

The principles of what we call remote diagnosis can also be effectively applied to use on Earth. At the present time, we have a well-developed network of satellites. This underscores the question of whether it would be possible to use this network to allow a hospital in some remote region of our country to communicate and exchange information with leading centers of medicine. Preliminary study has shown that this would not entail any major problems.

The prototype for such a system was experimentally tested during the 28th Soviet antarctic expedition. With the help of portable medical equipment, a doctor took an electrocardiogram and measured the blood pressure of a member of the expedition right in his shelter. The data received in the form of a digital radiogram was transmitted to Moscow by satellite. In one of the medical centers, operators processed the data in a computer and then transmitted their findings back to Antarctica by satellite.

The principles of remote diagnosis have formed the basis for our country's mobile automated laboratory ("Avtosan") for mass examination of the population. This laboratory is equipped with the same medical apparatus as the "Salyut" orbital station. The examination of one patient takes about 15 minutes and more than 50 different indicators are measured and processed. Two portable computers analyze the data obtained. All results of this express diagnosis are transmitted to special scientific centers where they are processed. The centers then send back recommendations for the patient and doctor. All of the data obtained from patients is entered into a data bank from where it is reviewed in annual surveys.

It is understood that it is still difficult at this time for us to serve everyone using such "space" methods and systems of research. However, it is also quite obvious that this work has laid the foundations for the medicine of the future.

#### In Terrestrial Clinics

Much of this type of equipment presently goes to health care. It is compact, simple to use and very reliable. Below are only a few examples of its uses.

The "Oxymeter" created to study changes in the oxygen supply to human tissues during space flight is used in several clinics for diagnosis of a series of illnesses: in stomatology for paradontosis, in therapy for stomach and duodenal ulcers, in cardiology for ischemic illness to determine the circulatory system's predisposition to spasms, which is very important to know for preventing infarct.

The "Tonus" device which is used in space medicine to electrically stimulate muscles has found use in traumatological medicine to strengthen muscles, to treat poor posture, plaxotomy, muscle atrophy and for convalescent patients to prevent thrombosis.

The "Argument" apparatus for ultrasound location of the heart and large blood vessels has become very useful. It can be used to examine the heart almost as if from within. It can provide information on the condition of the heart's chambers, aorta and vena cava and how the valves and heart muscles are working. This portable device is already being used successfully in clinics and will soon appear in "first aid" machines which will considerably improve emergency diagnosis.

12261  
CSO: 1840/298

## HYDROPONICS DEVELOPMENTS FOR SPACESHIP GARDEN

Moscow NTR: PROBLEMIY I RESHENIYA 5 Feb 85 p 6

MESHKOV, Yu.

[Abstract] The lengthy article reports on developments in hydroponics which have grown out of research initiated in the 1960s at the USSR Health Ministry's Institute of Medical-Biological Problems (IMBP) and aimed at developing kitchen gardens for spaceships.

Candidate of Technical Sciences Valentin Nikolayevich Golovin, head of a laboratory of IMBP, related that the technology involves plastic cassettes containing seeds which are placed in a vat with a nutrient solution. The laboratory has been studying spacing of plants at various stages of development in hydroponic units so as to realize optimum use of area and to maximize the effectiveness of light from natural and artificial sources falling on plants. One of the findings has been that if the efficiency of utilization of light energy is increased by 20-30 times, a comparable increase in the yield of biomass from one square meter of area can be realized. The studies led to the development of a compact unit called "Samorod-Arktika" for hydroponic cultivation of plants at outposts in Arctic regions. With an area of 0.5 square meter, the unit is intended for serving the same dual role for workers at polar outposts that a spaceship garden would: furnishing vitamins for the diet, and providing the psychological effect of having greenery. The unit fits easily on a table or wall shelf. Its servicing takes only three minutes a day: harvesting mature plants, replacing cassettes, and setting levers for the supply of nutrient solution. About 10 such units, some of which are larger, are in service at polar outposts. One on an island in the Kara Sea has been yielding up to one kilogram of lettuce daily from an area of one square meter.

IMBP has subsequently developed units which are 14 and 20 meters long. The vitamin value of biomass grown in them is said to be equal to and in some cases greater than that of conventionally cultivated plants.

The article goes on to comment on prospects for developing this technology on a commercial scale to help solve worldwide problems of limited land, water and energy resources for agriculture.

A drawing is given showing a diagram of a hydroponic unit, and a photograph is given showing a large, multiple-level unit.

AGROTECHNOLOGY

UDC 631.84

NOVEL NITRIFICATION INHIBITOR: 1-CARBAMOYL-3(5)-METHYLPYRAZOLE

Moscow AGROKHIMIYA in Russian No 3, Mar 85 (manuscript received 23 Oct 83)  
pp 10-17

LANG, G. S., HARTBRICH, K.-Y., WAL'TER, R., MORITS, K., GUNTER, K., YASHE, K., TIME, K., YUMAR, A. and KLEPEL', M. (Lang, S., Hartbrih, H.-I., Walter, R., Moritz, K., Gunter, K., Yashe, K., Time, H., Yumar, A. and Klepel, M.), Agro-chemie Concern, Pisteritz, GDR

Abstract Inhibitors of nitrification are gaining wide acceptance for improving the efficiency of nitrogenous fertilizers and alleviating their potential adverse environmental impact. In the GDR extensive screening of various pyrazole derivatives as possible inhibitors led to the identification of 1-carbamoyl-3(5)-methylpyrazole as a very effective and relatively safe agent. Field and laboratory trials with this agent have shown it to be highly effective in reducing soil levels of nitrates in concentrations (1-2 mg/kg) that are considerably lower than those in which the widely accepted N-Serve agent has to be used. To date, trials have involved application of this agent as a 50-60% aqueous suspension. Current studies have shown its efficacy when used in combination with nitrogenous fertilizers. In 1982 studies were commenced in the USSR on the agrochemical characteristics of this compound. Figures 2; references 24: 1 Czech, 2 Russian, 21 German and Western.

I062-121727

UDC 631.84:631.461.3

COMPARATIVE EFFECTIVENESS OF 1-CARBAMOYL-2(5)-METHYLPYRAZOLE AND OTHER INHIBITORS OF NITRIFICATION

Moscow AGROKHIMIYA in Russian No 3, Mar 85 (manuscript received 13 Aug 84)  
pp 18-25

YANISHEVSKIY, F.V., BLYUM, B.G., VYVOLOKINA, A.G., VODOP'YANOV, V. G. and MIKHAYLOV, Yu.I., Scientific Research Institute of Fertilizers and Insecto-fungicides; "Minudobreniye" Scientific Industrial Association

Abstract Comparative assessment was conducted on the effectiveness of 1-carbamoyl-2(5)-methylpyrazole (CMP), ATC (4-amino-1,2,4-triazole HCl) and nitrapyrine as inhibitors of nitrification. Field and laboratory trials conducted on a variety of Soviet soils demonstrated that all agents were effective in inhibiting nitrification and reducing nitrogen loss from the soil, as well as in enhancing the effectiveness of urea fertilizers. Used in doses equivalent to 1-5% of the dose of the nitrogenous fertilizer, CMP gave results equivalent to those attained with ATC, but was somewhat less effective than equivalent doses of nitrapyrine. CMP was most effective on soddy-podzolic soils with medium to heavy clay content, markedly improving yields of rice and corn. References 17: 16 Russian, 1 East German.

I062-12172

UDC 631.8:632.954

THEORETICAL AND PRACTICAL ASPECTS OF COMBINED APPLICATION OF HERBICIDES AND FERTILIZERS

Moscow AGROKHIMIYA in Russian No 3, Mar 85 (manuscript received 17 Jul 84)  
pp 81-85

LADONIN, V.F., KARAKULEV, V.V., LUKIN, S.M. and MARKS, Ye.I., TsINAO Expansion unknown

Abstract A review is presented of studies conducted on the combined use of fertilizers and herbicides under various crops in various regions of the USSR, representing different geoclimatic conditions. The collected data clearly demonstrated that the nutritional status of the plant has a profound influence on their susceptibility of the various herbicides tested (2,4-D, 2M-4Kh, etc.). In the case of weeds, for example, greater susceptibility to 2M-4Kh was directly correlated with a more favorable nutritional status, leading to a more efficient weed-killing rate. The resultant reduction in the need for fertilizers resulted in a more cost-efficient operation yielding greater crop harvest with less expenditure of fertilizer. On balance, studies in a number of regions (nonchernozem zone, Southern Urals, Volga valley, Western Siberia, etc.) have indicated that combined use of herbicides and fertilizers has a mutually beneficial effect on the action of both components. References 11 (Russian).

I062-12172

## METHOD FOR ASSESSING PESTICIDE EFFECTS ON SOIL MICROORGANISMS

Moscow AGROKHIMIYA in Russian No 3, Mar 85 (manuscript received 20 Jun 84)  
pp 86-93

ANAN'YEVA, N.D., STREKOZOV, B.P., TYURYUKANOVA, G.K. and MAKAROVA, T.V.,  
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Abstract The respirometric method for assessing microbial biomass in the soil has been modified to evaluate the effects of pesticides on soil micro-organisms, emphasizing the use of Soviet instruments and reagents. Basically, determination of soil microbial biomass is predicated on measurement of the initial rate of respiration after soil enrichment with glucose as an additional source of carbon and energy. At incubation temperature of  $22 \pm 0.5^{\circ}\text{C}$  the maximum respiratory rate (1 ml  $\text{CO}_2$  produced per hour) corresponds to 40 mg of microbial biomass carbon. The method is reproducible when respiration is measured within 1-3 h of glucose enrichment. The microbial biomass levels thus determined constitute a sensitive indicator of the effects of the pesticides employed in the field. Figures 4; references 12: 4 Russian, 8 Western.  
[I062-12172]

DISTRIBUTION OF RESIDUAL CONCENTRATIONS OF PESTICIDES IN TOP SOIL. PART 1.  
TEST FIELDS AND MIXED SAMPLES

Moscow AGROKHIMIYA in Russian No 3, Mar 85 (manuscript received 94-100

BABKINA, E.I., AN, R.M., ANTIPINA, N.Ye., BELOUS, B.A., DYKHALIN, Yu.S.,  
KAL'DINA, A.V. and PLOTNIKOVA, L.P.

Abstract An analysis was conducted on optimum method of soil sample selection to determine residual concentrations of pesticides, e.g., DDT, DDE, gamma- and alpha-hexachlorocyclohexane. The field trials were conducted on five different regions of the USSR (Moldavia, Uzbekistan, Kirghizia, Kuybyshev Oblast, Irkutsk Oblast) and showed a coefficient of variation of 40-77%. The most reliable data on the dissemination of the organochlorine pesticides, in comparison with the mean of 100 samples, was obtained by determination of the arithmetic mean of ten combined samples selected along the axis of a 1 ha (100 x 100 m) plot and perpendicularly to the furrows. In the latter case the error was within 5 to 30%. Combined samples consisting of 10 to 19 individual samples prepared by mechanical mixing were found to give a reliable indication of top soil contamination of 1-2 ha fields. Figures 1; references 10: 8 Russian, 2 Western.  
[I062-12172]

UDC 632.95:546.811:595.70

TIN COMPOUNDS AND INSECT FAUNA

Moscow AGROKHIMIYA in Russian No 3, Mar 85 (manuscript received pp 124-134

BUTOVSKIY, R.O.

Abstract A review of the literature of tin compounds serving as pesticides has resulted in the identification of 11 widely used compounds, both organic and inorganic, with largely fungicidal activity. Organotin compounds seem to be limited in use to the control of insect pests, with the majority of the compounds consisting of Sn(IV) and falling into the following four categories:  $R_4Sn$ ,  $R_3SnX$ ,  $R_2SnX_2$ , and  $RSnX_3$ , where  $R$  = aliphatic or aromatic hydrocarbon radical, and  $X$  = organic or inorganic substituent. The insecticidal activity of these compounds appears to rest on inhibition of ATPase and uncoupling of oxidative phosphorylation. As a result, these compounds act as larvicides, ovicides and imagocides. References 77: 1 Polish, 1 Serbian, 4 Russian, 71 Western.

I062-121727

UDC 575.1:633.11

FROST AND WINTER RESISTANCE PROBLEMS IN GENETIC STUDIES OF WINTER WHEAT

Moscow GENETIKA in Russian Vol 21, No 1, Jan 85 (manuscript received 19 Jan 85; after final revision 27 Feb 84) pp 15-22

ORLYUK, A. P., Ukrainian Scientific Research Institute of Irrigated Agriculture, Kherson

Abstract The most important studies of winter resistance were reviewed in connection with efforts to select winter wheat. Frost and winter resistance are polyfactorial properties with a threshold effect of manifestation so that only surviving plants are available to the experimenter after exposure to low temperatures. Among the dead plants there may be various degrees of resistance, however. Polyfactorial genetic control of the stability creates a base for allele complementation during the hybridization and cross-over process leading to transgressive forms with desired variations. At present, it is difficult to predict the parameters of transgressive variations. The stability testing methods based on various biophysical and morphological indicators play an important role. Low growth and productivity of winter wheat can hardly be correlated with frost and winter resistance. The best results are obtained by crossing the winter resistant form with a highly productive one. An effective method of induction is based on the use of mutagenic factors of low growth mutations in winter resistant brands. References 49: 45 Russian (3 by Western authors), 4 Western.

I824-78137

UDC 633.14:631.523

INVESTIGATION OF CHROMOSOME NUMBER IN PROGENY OBTAINED FROM CROSSING  
TRITICUM PALEOCOLCHICUM MEN. WITH INCOMPLETE WHEAT-ELYMUS (WILD RYE)  
AMPHIDIPOID AD-90

Moscow GENETIKA in Russian Vol 21, No 1, Jan 85 (manuscript received 23 Feb 84)  
pp 129-137

SEMELEV, V. I., SEMENOVA, Ye. V., MASLOVA, M. A. and SMYSLOVA, V. D., Main  
Botanical Garden, USSR Academy of Sciences, Moscow

Abstract The number of chromosomes in generations  $F_2$  and  $F_3$  obtained by crossing Triticum paleocolchicum Men. with wheat-elymus amphidiploid AD-90 was studied. In  $F_2$  plants of the pentaploid hybrid, the number of chromosomes ranged from 28 to 42. Analogously to previously studied hybrids T. durum L. x AD-99, a left-handed asymmetry of chromosome numbers was noted although to a lesser degree. In the  $F_3$  generation the left-handed asymmetry was even less pronounced. It was concluded that selection of pairs for crossing and isolation of genotypes within the range of combinations may lead to significantly lower degree of left-handed asymmetry in the distribution of M genome chromosomes along subsequent generations. Consequently, the probability of the appearance of recombinant forms increases to the same degree in which the wheat chromosome is inserted into the hereditary material from the M genome chromosome of elymus, along with greater chances of isolating the desired forms. Figures 2; references 4 (Russian).

/T824-7813/

UDC 633.14:631.523

INVESTIGATION OF CHROMOSOME NUMBERS IN  $F_2$  GENERATION OBTAINED BY CROSSING  
COMMON WHEAT AND SOME OF ITS TELOCENTRIC LINES WITH PERENNIAL WHEAT

Moscow GENETIKA in Russian Vol 21, No 1, Jan 85 (manuscript received 23 Feb 85)  
pp 117-128

SEMELEV, V. I., SEMENOVA, Ye. V. and VOSTRIKOVA, T. I., Main Botanical Garden,  
USSR Academy of Sciences, Moscow

Abstract The goal of the present study was to establish the transmission of univalent chromosomes of genome X to the next generation by studying the number of chromosomes in the  $F_2$  generation of the crossing studied. Two genetically different forms of common wheat and five telocentric lines were crossed with perennial wheat leading to septaploid hybrids  $F_1$  in which the X genome was found in the univalent state. In meiosis, it was distributed irregularly so that, starting with the  $F_2$  generation, the number of chromosomes varied from 40 to 56. The distribution was quite specific in all cases studied so random distribution was excluded. Both of the combinations studied showed a strong left-handed asymmetry in chromosome distribution pattern.

However, this asymmetry was less pronounced than that found in  $F_2$  generation of pentaploid hybrids; these differences may be related to "buffering" action of this high level ploidy. Chromosome distribution in telocentric lines have a lesser left hand asymmetry (except for 6A). The variants obtained from crossings with 1 AL and 5 DL are practically symmetrical. This is important for selection because it shows that X genome chromosome may drift in the cells without elimination and cause translocations with wheat chromosomes. An interesting hybrid combination exists with 1 AL because it has a very high frequency of plants in the 49 chromosome class which may be a result of partial apomixis. Figures 2; references 28: 9 Russian, 19 Western.

1824-7813

BIOCHEMISTRY

UDC 577.352.4

MOLECULAR ORGANIZATION OF GLUTAMATE-SENSITIVE CHEMOEXCITABLE NEURONAL MEMBRANES:  
LIPOSOMAL MODEL STUDY OF GLUTAMATE-BINDING CNS PROTEINS

Moscow BIOKHIMIYA in Russian Vol 50, No 3, Mar 85 (manuscript received  
3 Mar 84) pp 363-368

BESEDIN, V.I., KUZNETSOV, A.S. and DAMBINOVA, S.A., Institute of Experimental  
Medicine, USSR Academy of Medical Sciences, Leningrad

Abstract In order to define the ionophoric role of glutamate-binding receptor proteins (GBRP) of the rat cerebral cortex, such proteins were isolated from the brains of outbred rats and incorporated into egg lecithin/cholesterol liposomes for radiotracer ( $^{22}\text{Na}^+$ ,  $^{86}\text{Rb}^+$ ) uptake studies. Comparative analysis of the  $\text{Na}^+$  and  $\text{Rb}^+$  uptake by experimental and control liposomes in the presence and absence of L-glutamate in the medium, demonstrated that glutamate, in a concentration of  $10^{-4}$  M, enhanced ingress of  $\text{Na}^+$ . The specific activation of  $\text{Na}^+$  uptake was inhibited by monoclonal antibodies directed against GBRP. The data were interpreted to indicate that native GBRP was incorporated into the liposomes, and that its physiological role consists of regulating  $\text{Na}^+$  transport in response to the binding of glutamate. The GBRP glycoprotein is proposed to consist of several subunits which, under proper conditions, form a sodium channel. Figures 5; references 16: 7 Russian, 9 Western.

1867-12172

UDC 577.152.1

EFFICIENCY OF BINARY ENZYME SYSTEM NADH:OXIDOREDUCTASE:LUCIFERASE IN  
LUMINESCENT BACTERIA

Moscow BIOKHIMIYA in Russian Vol 50, No 3, Mar 85 (manuscript received  
28 May 84) pp 401-405

PETUSHKOV, V.N., RODIONOVA, N.S. and BELOBROV, P.I., Institute of Biophysics, Siberian Department, USSR Academy of Sciences, Krasnoyarsk

Abstract The binary enzyme system NADH:oxidoreductase:luciferase of *Beneckea harveyi* was studied for its efficiency in the transduction of the

reducing equivalents NADH into light quanta. The efficiency in the spectrophotometric assay was calculated at  $1.1 \times 10^{-3}$  quanta/NADH molecule in the presence of 14 mcg/ml of luciferase in 0.1 M sodium phosphate buffer, pH 7.0. The efficiency remained unchanged when the starting concentration of NADH was varied over three order of magnitude, or the reductase concentration from 0.6 to 12 IU. Maximum transduction was obtained in the presence of  $10^{-7}$  M FMN and  $1.4 \times 10^{-6}$  M BSA /bovine serum albumin/. Figures 5; references 13: 3 Russian, 10 Western.

/T867-12172/

UDC 577.151

#### EFFECTS OF AZOTIZATION ON CATALYTIC ACTIVITY OF RNase

Moscow BIORHIMIYA in Russian Vol 50, No 3, Mar 85 (manuscript received 4 Jun 84) pp 406-411

KALACHEVA, N.V. and KURINENKO, B.M., Kazan State University imeni V.I. Ul'yanov-Lenin

Abstract In view of previous reports that immobilization of RNase on soluble dextran may enhance its catalytic activity, expanded catalytic studies were conducted with pancreatic and Act. rimosus RNases to determine the effects of covalent linkage to dextran via diazo groups. In the case of pancreatic RNase, optimum pH was shifted from  $7.5 \pm 0.2$  for the native enzyme to  $pH 8.0 \pm 0.2$  for the modified enzyme in  $0.06$  M tris-HCl buffer. This change was ascribed to residual diazo groups (-Ar-N=N) that remained unbound on the dextran. However, the microbial enzyme showed no change in optimal pH with the same substrate (high MW yeast RNA). Furthermore, in the case of both enzymes there were no changes in the optimal temperatures or the  $K_m$  values. Consequently, with high MW RNA substrate there was no evidence of any changes in the fundamental catalytic properties of the bound enzymes. Nevertheless, differences were evident with low MW substrates, as indicated by the increase in the synthetic activity of modified pancreatic RNase relative to its hydrolytic activity in the synthesis of dicytidinemonophosphate. Figures 1; references 15: 12 Russian, 3 Western.

/T867-12172/

## DESTABILASE: ENZYME IN SALIVARY SECRETIONS OF MEDICINAL LEECH THAT HYDROLYZES ISOPEPTIDE BONDS IN STABILIZED FIBRIN

Moscow BIORHIMIYA in Russian Vol 50, No 3, Mar 85 (manuscript received 19 Jun 84) pp 424-431

BASKOVA, I.P. and NIKONOV, G.I., Laboratory of Blood Coagulation Physiology and Biochemistry, Biology Faculty, Moscow State University imeni M. V. Lomonosov

Abstract An enzyme has been isolated from the salivary secretions of the medicinal leech *Hirudo medicinalis* that hydrolyzes the epsilon-(gamma-glutamyl)-lysine bonds linking individual monomers in stabilized fibrin. The enzyme, designated destabilase, was determined to have an amidolytic activity of  $2.2 \pm 0.18$  ncat/ml, and for destabilization a  $K_m$  (app) =  $0.6 \times 10^{-5}$  M and a  $V = 5.4 \times 10^{-3}$  moles/min. Preliminary analysis on PAG electrophoresis have yielded a MW of 5000-8000 daltons, with maximum absorption at 278 nm. Application of the enzyme to fibrin clots led to the appearance of liquid pools of depolymerized fibrin, with the activity of the enzymes increasing in direct proportion to the degree of fibrin stabilization. The activity was not affected by the addition of diisopropylfluorophosphate, but completely inhibited by monoiodoacetate. Studies with chromogenic substrates showed that destabilase did not convert plasminogen to plasmin as does streptokinase. Finally, destabilase was found to be without caseinolytic or esterase activities. Figures 6; references 34 (Western).

I867-12172

## CARBON MONOXIDE DEHYDROGENASE OF DESULFOVIBRIO DESULFURICANS

Moscow BIORHIMIYA in Russian Vol 50, No 3, Mar 85 (manuscript received 5 Jul 84) pp 454-458

TARASOVA, N.B., MUKHITOVA, F.K., RYAZANTSEVA, I.N. and BELYAYEVA, M.I., Institute of Biology, Kazan Branch, USSR Academy of Sciences

Abstract Extracts of *Desulfovibrio desulfuricans* were studied for carbon monoxide dehydrogenase (CMD) activity, which demonstrated that CMD activity is dependent on the concentration of CO in the gas phase, the temperature, and pH. The enzymatic activity followed standard Michaelis-Menten kinetics, yielding a  $K_m = 5 \mu\text{M}$  and  $V = 43.3 \mu\text{M}/\text{min}$  at  $35^\circ\text{C}$ , pH 8.0 (0.15 M tris-HCl buffer), with methyl viologen as electron acceptor. Maximum activity, however, was seen with FMN as the electron acceptor. Studies with various inhibitors confirmed the impression that CMD is a metalloenzyme, with cells grown in the presence of  $1 \mu\text{M} \text{NiCl}_2$  showing elevated CMD activity at all stages of growth. Activity of the extracts was not affected by storage at  $22^\circ\text{C}$  for 1 month under 100% CO. Figures 4; references 14: 4 Russian, 10 Western.

I867-12172

UDC 577.152.31

ESTERASES OF COCKROACH NERVE GANGLIA: ISOENZYMES AND INHIBITORY SPECIFICITY

Moscow BIORHIMIYA in Russian Vol 50, No 3, Mar 85 (manuscript received 12 Jul 84) pp 475-484

VOLKOVA, R.I. and TITOVA, E.V., Institute of Evolutionary Physiology and Biochemistry imeni I.M. Sechenov, USSR Academy of Sciences, Leningrad

Abstract Polyacrylamide gel electrophoresis has revealed 13 esterase isozymes in the nerve ganglia of the cockroach (*Periplaneta americana*), on the basis of hydrolysis of the nonspecific substrate 1-naphthylacetate. Each of the molecular forms was inhibited by standard organophosphorus agents (insecticides), with the 10 isozymes showing the most anodal mobility identified as carboxylesterases and the remaining three as cholinesterases. Inhibition studies demonstrated that the stereospecificity of the cholinesterases was analogous to that of mammalian blood acetylcholinesterase, while that of the carboxylesterases, to that of mammalian butyrylcholinesterase. Studies with organophosphorus compounds with carbomethoxyl groups and amino acid moieties (glycine, beta-alanine, valine) resulted in the identification of novel insecticides highly selective for cockroach carboxylesterase,  $\text{CH}_3(\text{RO})\text{P}(\text{O})\text{SCH}_2\text{SCH}_2\text{COOCH}_2$ , where R =  $\text{C}_9\text{H}_{19}$  or  $\text{C}_{10}\text{H}_{21}$ . Cockroach acetylcholinesterase had no particular specificity for the amino acids, while carboxylesterase was particularly susceptible to agents with valine.

Figures 4; references 26: 19 Russian, 7 Western.

I867-12172

UDC 577.152.5

HYDRAZINOLYSIS OF DNA AND RESOLUTION OF PURINE OLIGONUCLEOTIDES BY DEAE-CELLULOSE TLC FOR DETERMINATION OF SH. SONNEI METHYLASE RECOGNITION SITE

Moscow BIORHIMIYA in Russian Vol 50, No 3, Mar 85 (manuscript received 23 Jul 84) pp 495-502

LOPATINA, N.G., KIRNOS, N. D., SUCHKOV, S.V., VANYUSHIN, B.F., NIKOL'SKAYA, I.I. and DEBOV, S.S., Scientific Research Institute of Medical Enzymology, USSR Academy of Medical Sciences, Moscow; Laboratory of Molecular Biology and Bioorganic Chemistry imeni A.N. Belozerskiy, Moscow State University imeni M.V. Lomonosov

Abstract A method has been developed for the determination of recognition sites for *Sh. sonnei* adenine-specific methylase (SsoI), which relies on hydrazinolysis of DNA substrate and subsequent resolution of purine oligonucleotides on the basis of length and composition by DEAE-cellulose TLC. In this manner, distribution of  $\text{N}^6$ -methyladenine among the purine blocks can be identified, leading to the recognition site of the adenine-specific methylase. An added feature of this technique is the fact that it allows

studies on DNA with low-level incorporation of the label, and requires relatively little time to achieve separation of the purine oligonucleotides by two-dimensional TLC. Experiments with SsoI and phage lambda DNA led to the determination of the recognition site as the following palindromic sequence, in which the methylated base is indicated by an asterisk: 5'...G- $\ddot{A}$ -A-T-T-C...3' and 3'...C-T-T-A- $\ddot{A}$ -G...5'. Of interest is the fact that SsoI recognizes the adenine base in proximity to the 5' end, rather than the 3' end as is the case with EcoRI. Figures 3; references 10: 5 Russian, 5 Western.

I867-12172

UDC 577.15.087

#### BIOLUMINESCENCE ANALYSIS OF INSECT PHEROMONES OF ALDEHYDE NATURE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 281, No 4, Apr 85  
(manuscript received 4 Sep 84) pp 990-993

ISMAILOV, A.D., SAKHAROV, G.N., DANILOV, V.S., KOVALEV, B.G., STRELISKIY, V.V. and YEGOROV, N.S., Moscow State University imeni M.V. Lomonosov; All-Union Scientific Research Institute of Biological Methods of Plant Protection, Kishinev

Abstract Studies of the structure and biological effect of insect sex pheromones are greatly impeded because of the structural diversity of the components, low stability and especially by the minute quantity of pheromones given off by insects into the air. Therefore, this study was devoted to development of a new bioluminescent method of express analysis of aldehyde pheromones by use of luminescent activity of the enzyme bacterial luciferase in analytical tests. The study showed that bacterial luciferase may be used as a fast-acting, highly sensitive detector of trace amounts of the pheromones studied. Such a detection system is effective in screening synthetic analogs of aldehyde pheromones with 1 unsaturated bond, extracts of the body, glands and antennae as well as in detecting pheromones in air. Identification of components of complex mixtures of aldehydes requires additional processing. Conversion of basic and minor components of insects pheromones, alcohols and acetates, can be performed by an enzymic method, which greatly extends the scope of use of the bioluminescent method. Figures 2; references 12: 5 Russian, 7 Western.

I861-2791

UDC 591.185.1

ORIENTATION OF FISH DURING MIGRATION

Moscow USPEKHI SOVREMENNOY BIOLOGII in Russian Vol 99, No 1, Jan-Feb 85,  
pp 141-154

CHURMASOV, A.V., UL'YANOV, M.Yu. and PROTASOV, V.R., Scientific Research Institute of Applied Mathematics and Cybernetics, Gorki State University; Institute of Evolutionary Morphology and Ecology of Animals imeni A. N. Severtsov, USSR Academy of Sciences, Moscow

*[Abstract]* This survey of the literature concerning orientation of fish during migrations presents findings reported in papers dealing with orientation of fish by local landmarks, orientation by magnetic features and navigation by fish. Navigation by migrating fish is carried out by a complex of global (sun, stars, Earth's magnetic field) and local (temperature gradients, salinity gradients, traces of odors, currents, bottom relief and landmarks) orienters. Use of global landmarks to maintain a constant course of migration is especially important during ocean migrations. The final stages of migrations are completed successfully with the aid of local orienters. References 169: 71 Russian, 58 Western.

*[I869-2791]*

BIOPHYSICS

UDC 577.3

INTERACTION OF DISCRETE CHARGES AT AIR-WATER INTERFACE: FACTOR IN ANOMALOUSLY HIGH SURFACE ACTIVITY OF MELITTIN

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 85 (manuscript received 16 Jul 84) pp 72-75

KSENZHEK, O.S. and GEVOD, V.S., Dnepropetrovsk Institute of Chemical Technology

Abstract An analysis was conducted of the factors that are responsible for the fact that the surface activity of the peptide melittin at air-water interface is 2- to 3-orders of magnitude greater than that of other surface active agents. In cases where the surface area per molecule of melittin is on the order of 100 to 300 nm<sup>2</sup>, the surface tension shows an increase of 5-7 mN/M. Such anomalously high surface tension could not be explained by the Davies-Gaustalla equation, but was accounted for by electrostatic charge repulsion in the surface monolayer. The data were confirmed by experimental plots of micropotential vs. melittin charge at surface area per molecule ratios of 40, 100 and 400 nm<sup>2</sup>/molecule. Figures 4; references 4 (Western) (one by these Soviet authors).

/I840-12172/

UDC (574.5:581.526.325.3)(26)

LUMINESCENCE ANALYSIS OF BLACK SEA PHYTOPLANKTON

Kiev GIDROBIOLOGICHESKIY ZHURNAL in Russian Vol 24, No 1, Jan-Feb 85 (manuscript received 18 Aug 81) pp 12-16

ROUKHIYAYNEN, M.I. and SENICHKINA, L.G., Institute of Biology of the Southern Seas, UkrSSR Academy of Sciences, Sevastopol

Abstract Study of the functional state of phytoplankton by luminescence analysis was carried out in May 1981 in the western part of the Black Sea. Samples were taken at 46 stations and analyzed by the standard method under a light microscope and by luminescence microscopy under blue light. The

dominant phytoplankton species (*Skeletonema costatum*, *Ebria tripartita* and *Pontosphaera huxleyi*) occupied distinct areas of distribution. The most cells (146 billion cells/m<sup>3</sup>) were found in the Danube region and the greatest biomass (61g/m<sup>3</sup>) was found in the coastal region of Burgassian Bay. The greatest part of phytoplankton in the Danube region was in the autolysis stage and not more than 30 percent of the cells luminesced bright red. In the rest of the water area, almost all of the phytoplankton of other species composition was in a good physiological state, with the exception of the coastal area of Burgassian Bay, where only 30 percent of the predominant population, *Cerataulina bergonii*, consisted of bright-red luminescent cells. Among *Peridina*, *Chrysophyta* and fine Flagellata algae were species with no detectable chlorophyll which did not luminescence at all or luminesced green. Figure 1; references 13: 9 Russian, 4 Western.

I871-2791

UDC 577.3

#### BIOMEDICAL APPLICATIONS OF ELECTRICAL BREAKDOWN OF CELL MEMBRANES

Moscow USPEKHI SOVREMENNOY BIOLOGII in Russian Vol 99, No 1, Jan-Feb 85,  
pp 67-80

CHERNOMORDIK, L.V., USSR Academy of Sciences, Institute of Electrochemistry  
imeni A.N. Frumkin, Moscow

Abstract A survey of the literature is used in a discussion of the possible role of electrical breakdown in different physiological processes and in a discussion of use of this phenomenon to sterilize cells and to introduce physiologically active substances, especially allogenic genetic material, into cells. Application of a strong electric field to biological membranes leads to electrical breakdown with temporary or permanent disturbance of their barrier function. The phenomenology and mechanism of this breakdown is discussed and its possible role in some physiological processes is examined. Prospective uses of cell membrane breakdown to sterilize cells, introduce medicines into them and to transform cells are presented and discussed.

Figures 2; references 58: 13 Russian, 45 Western.

I869-2791

EFFECT OF CALMODULIN ANTAGONISTS ON MEMBRANE POTENTIAL AND POTASSIUM PERMEABILITY OF THYMOCYTES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 281 No 4, Apr 85 (manuscript received 14 Aug 84) pp 978-981

GUKOVSKAYA, A.S. and ZINCHENKO, V.P., Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast

Abstract / Study of the effect of calmodulin antagonists of the phenothiazine series, trifluoroperazine [TFP] and chloropromazine [CPZ] on membrane potential and potassium permeability of rat thymocytes in the resting state and on change of these parameters under the effect of  $Ca^{2+}$  - ionophore A23187, showed that these antagonists depolarize the thymocytes. The cause of depolarization by the phenothiazines is the change of ionic permeability of the thymocyte membrane. Effect of the phenothiazines appears in the presence of agents which change potassium permeability of the thymocyte membrane:  $K^{+}$ -ionophore of valinomycin,  $Ca^{2+}$ -ionophore A23187 and quinine. The amount of valinomycin or A23187 induced hyperpolarization depends on the concentration in the medium. Increase of the fluorescent response to valinomycin or A23187 at low doses of phenothiazines is due to the fact that such concentrations of TFP or CPZ depolarize the resting cell but leave practically unchanged the potential of thymocytes, the potassium permeability of which was increased by treatment with valinomycin or A23187. Effect of depolarization appears in the regions of concentrations of phenothiazines ( $10^{-6}$ - $10^{-5}M$ ) in which they block participation of calmodulin in various biological processes. Results of the study indicate that calmodulin participates in maintenance of a low level of sodium permeability of the resting thymocyte membrane.

Figure 3; references 15: 5 Russian, 10 Western.

/1861-2791/

## ENGINEERING APPLICATIONS FOR BIOLOGICAL MOLECULES

Moscow ZNANIYE - SILA in Russian No 11, Nov 84 p 2

[Article in the column "Scientific Courier": "A Biocomputer?"]

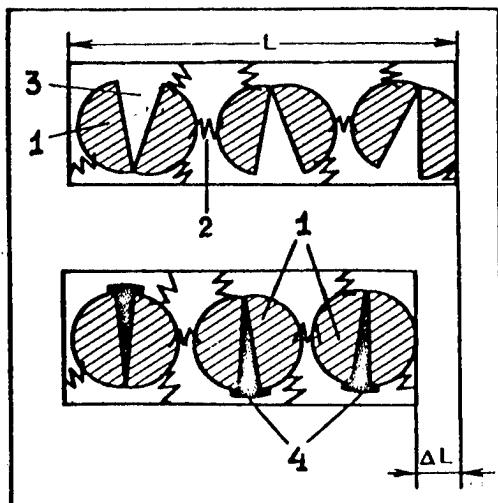
[Text] Today you won't surprise anyone by saying that biological "patents" are a constant source of new ideas for engineers. The hydrodynamic perfection of the shunts in dolphins, the mechanical strength of animals' skeletons, and the efficient transformation of energy during muscle contraction, have all attracted the attention of designers, process engineers, and design engineers. But, as a rule, up until recently engineers did not pay much attention to the operation of individual "living" molecules. Consider, for example, a pepsin molecule, pepsin being an important protein enzyme that is involved in digestion. This molecule breaks up protein molecules. Our "stomach" molecule does its job without wasting any energy, with an efficiency coefficient practically equal to 1.

It is not possible to create an analogous technical device with this kind of efficiency coefficient--it is impossible to eliminate energy losses due to friction. But what if you take the molecule itself and build it into some kind of mechanism?

Regardless of how fantastic this may sound, there is already a real basis for practical implementation of this idea. Recently, more and more can be heard about biological micro-devices that can be used as transmitters and processors. Biological elements, such as proteins, enzymes, and cellular systems, are used in these devices.

A method was recently developed at the Biological Physics Institute of the USSR Academy of Sciences that makes it possible to record changes in the dimensions of molecules with a great deal of accuracy. The scientists used a lysozyme protein in their research. This enzyme serves as an antibacterial barrier, and it is found in tears, saliva, and in the nasal mucous membrane. The molecule is almost spherical in form and it is called a globule. The globule is comprised of two parts that are separated by a slit. The halves of the molecule on either side of the slit move as a single unit, and they can even be viewed as a hinged structure. This design makes it possible to rupture the membrane of a bacterial cell as soon as one of the membrane components, a complex polysaccharide, gets into the slit.

From this design scientists got the idea of using a lysozyme molecule as a biological transmitter for identifying certain substances in a solution--substrates, inhibitors, and so on.



Protein transmitter for identifying a substance in a solution: 1--protein molecule; 2--chemical bonds; 3--slit; 4--molecule of the unknown substance "held" in the slit;  $\Delta L$ --change in the dimensions of the microtransmitter when bound to molecules of the unknown substance

Biological elements can also be used as memory devices. This was demonstrated in research performed on bacteriorhodopsin, a substance similar to rhodopsin, which is the primary visual pigment in the retina. After bacteriorhodopsin was found in the cell membranes of several bacteria, scientists at the Biological Physics Institute of the USSR Academy of Sciences discovered that if the bacteriorhodopsin is dehydrated, it can be stopped at a certain stage of the photochemical cycle, and the image recorded on the pigment is preserved. When the bacteriorhodopsin molecules interact with quanta of light, they change color. Why not use film made of bacteriorhodopsin as microelements for optical memory? This type of material, in the form of films and disks, has been developed by a number of our scientific institutes. A disk made of this biological material that is the size of a long-playing phonograph record can be used to record the text of several tens of thousands of books!

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CSO: 1840/1866

UDC 577.391;615.42

EFFECTS OF PROLONGED STORAGE ON GAMMA-STERILIZED IMMOBILIZED TRYPSIN

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 31 May 84) pp 106-108

VIRNIK, R.B., RYL'TSEV, V.V., VLASOV, L.G., SAMOYLOVA, T.I., DOVBIY, Ye.V. and KALASHNIK, A.T., All-Union Scientific Research Institute of the Textile and Clothing Industry, Moscow; All-Union Scientific Research and Planning Institute of Synthetic Fibers, Mytishchi

Abstract ESR and activity studies were conducted on native and immobilized trypsin subjected to long-term storage at room temperature under air, to determine the practical feasibility of such storage conditions following sterilization by gamma-irradiation. Studies on trypsin immobilized on dialdehyde cellulose (7 mg trypsin/g carrier) subjected to 5-100 kGy demonstrated that the ESR signals are due to free radicals arising on carbons 5 and 6 of the glucose moiety, with the immobilized trypsin failing to yield a signal. Over a 15 month storage period the number of free radicals decreased by 30-50% in a radiation dose-dependent fashion. Death of the dialdehyde cellulose radicals is apparently due to their recombination. Storage of native irradiated trypsin results in complete disappearance of the ESR signal after 15 months. Irradiation reduced the activity of native trypsin, as did subsequent storage: after 15 months at room temperature only 30% of the initial proteolytic activity was retained. Neither irradiation nor storage affected the initial activity of the immobilized enzyme, pointing to the utility of irradiation for sterilization of immobilized trypsin. References 12 (Russian).

1847-12172

IMMOBILIZED BACTERIAL PEPTIDE HYDROLASES IN PREPARATION OF PROTEIN HYDROLYSATES

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKHOLOGIYA in Russian Vol 30, No 4, Apr 85 (manuscript received 26 Oct 84) pp 243-249

NEKLYUDOV, A.D., NAVASHIN, S.M., BARTOSHEVICH, Yu.E. and TSIBANOV, V.V., All-Union Scientific Research Institute of Antibiotics, Moscow

Abstract Protosubtilin G10Kh (PS) and bacterial peptidase (BP) were immobilized on alumina activated with gamma-aminopropyltriethoxysilane, treated with 1% glutaraldehyde. In the process of immobilization of BP and PS the enzymes were partially purified by removal of some nonenzymatic proteins; the substrate specificity of the enzymes was essentially unchanged by immobilization, while thermal stability was markedly improved. An integrated mathematical model was devised for the enzyme kinetics of this preparation of heterogenous biocatalysts, and applied to the hydrolysis of sodium caseinate and peptide components of commercially available Soviet protein hydrolysates. Analysis of the products demonstrated that immobilized PS and BP can insure extensive protein hydrolysis to provide solutions consisting mostly of free amino acids and insignificant concentration of small peptides. Figures 8; references 12 (Russian).

1865-121727

UDC 551.46:541.144:579.222

EFFECT OF PHOTOCHEMICAL AND BACTERIAL OXIDATION ON PHYSICAL CHEMICAL PROPERTIES  
OF HYDROCARBON FILMS ON WATER SURFACE AND ON EVAPORATION RATE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 281, No 4, Apr 85 (manu-  
script received 13 Apr 84) pp 948-951

SOKOLOV, Ye. A., MISHUKOV, V. F., BENDERSKIY, V.A., MOISEYEVSKIY, G.N. and  
IL'YICHEV, V.I., academician, Pacific Ocean Oceanological Institute, USSR  
Academy of Sciences, Vladivostok

Abstract Kinetic mechanisms of change of properties of hydrocarbon film  
(hydroperoxides yield, change of tension, rate of flow and rate of evaporation  
of water within the film during its photochemical and bacteriological decompo-  
sition) were studied with n-hexadecane as an example in order to assess the  
influences of these changes on energy exchange and mass exchange between the  
ocean and atmosphere. As a model system, n-C<sub>16</sub> with addition of the photo-  
initiator 1-naphthol and photooxidation of model films was studied in a  
device which measured tension of the film and rate of water evaporation at  
20°C. Accumulation of surfactants in the process of photochemical and bacterial  
decomposition of hydrocarbons changed the physical-chemical properties of the  
films, affected the dynamics of spread of the naphthenic spot, increased the  
area of sea surface covered by film and reduced the water evaporation rate.  
Such changes may cause significant and uncontrolled changes of mass-exchange  
in the ocean-atmosphere system. Figures 3; references 7: 4 Russian, 3 Western.  
1861-27917

EPIDEMIOLOGY

UDC 616.931-055.5/7-036.2-07

BIOLOGICAL, GENETIC AND EPIDEMIOLOGIC ASPECTS OF DIPHTHERIA AND NORMAL HUMAN MICROFLORA

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 85 (manuscript received 5 Mar 84) pp 37-45

KRYLOVA, M.D., All-Union Institute of Genetics and Breeding of Industrial Microorganisms, Moscow

Abstract/ Extensive programs have been undertaken in the USSR to control diphtheria via preventive inoculation, as well as to eradicate the pathogen. As a result of such active measures, by 1975-1976 diphtheria morbidity fell 587-fold. However, both in the USSR and other countries, problems were encountered with complete eradication of diphtheria, and by 1977 the incidence began to rise. A characteristic feature of the disease at the present time is that it is mostly encountered in the 20 to 40 age group. In addition, a concomitant increase in adult and pediatric carriers has also been noted. The problem lies partially in the fact that immunity to diphtheria toxin lasts only for 8-9 years and, as a result, many adults lack significant amounts of antitoxin and are again susceptible to the disease. A further complication is presented by the fact that diphtheria bacilli cannot be isolated from many healthy carriers. These problems emphasize the importance of continuing active research efforts on the physiology and genetics of toxigenic strains, a need for a better understanding of the  $\text{tox}^+$  phage, and the preparation of effective immunogens. References 30: 26 Russian, 4 Western.

1848-121727

ECOLOGY AND EPIZOOTIOLOGY

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 85 (manuscript received 2 Apr 84) pp 99-103

KORENBERG, E.I., Scientific Research Institute of Epidemiology and Microbiology imeni N.F. Gamaleya, USSR Academy of Medical Sciences, Moscow

Abstract The problems of ecology and epizootiology were covered at a joint session of the Problem Commissions on "Endemic Human Infections" and "Scientific Foundations for Further Reduction and Liquidation of Infectious Diseases," held on February 28, 1984. Analysis of the complexity of factors determining the natural history of outbreaks and intermittent periods of infectious diseases shows that studies of epizootic processes at the population genetics level constitutes the most rational approach to understanding the dynamics and endemicity of such pathologies. Unfortunately, such an approach seems seriously underutilized. All too often various aspects of a given disease are studied in isolation and neglect the broader picture, and yet it is the interrelationship of various biological and climatological factors that determine natural foci of endemic infections. For further progress, an all-encompassing view will have to be taken and applied to research efforts.

References 47: 45 Russian, 2 Western.

/1848-12172/

GEOGRAPHIC FEATURES OF TICK-BORNE ENCEPHALITIS IN MARITIME PROVINCE

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 85 (manuscript received 14 May 84) pp 118-119

KOLONIN, G.V. and VAVILOVA, V.Ye., Pacific Institute of Geography, Far Eastern Scientific Center, USSR Academy of Sciences; Maritime Regional Sanitary and Epidemiologic Station, Vladivostok

Abstract Despite mass vaccinations, there is no overall trend toward a decrease in the incidence of tick-borne encephalitis in the Maritime Province despite annual fluctuations in morbidity. In recent years, the structure and geographic features of this entity have undergone marked changes, consisting of a decrease in the incidence of tick-borne encephalitis in working contingents, but increasing that in the population in general, particularly in the proximity of cities. As a result, these changes led to extensive re-evaluation of data that had been collected for a number of years. The result was the publication of the "Map of Tick-Borne Encephalitis in the Maritime Provinces: 1952-1981", prepared by G.V. Kolonin on the basis of material collated by V.Ye. Vavilova. The unique feature of this map is the fact that it is based on the place when an infection was contracted, rather than on the site of registration or the level of morbidity. The incidence of tick-borne encephalitis in the Province has increased in the last decade in comparison with the previous decade, with a particularly prominent increase seen in the southwestern areas.

GENETICS

SYNTHESIS OF PURE AMINO ACIDS THROUGH GENETIC ENGINEERING

Yerevan KOMMUNIST in Russian 20 Apr 85 p 4

Text Processes for the production of pure amino acids are under development at the Scientific Research and Technological Institute of Amino Acids.

Strains of microorganisms are being created by means of genetic-selection and genetic engineering methods, and physiological-biological characteristics of microorganisms that synthesize amino acids are being studied here. Experimental units are now being installed with which processes for obtaining pure amino acids will be improved. New amino-acid producing strains have been created, and a number of laboratory and experimental-industrial procedures have been prepared.

(A photograph shows Candidate of Chemical Sciences Artem Muradyan, head of the institute's laboratory for isolating and purifying microbiosynthesis products, and Sarkis Andreasyan, junior science associate, studying the composition of a solution on a printout sheet.)

FTD/SNAP  
CSO: 1840/321

UDC 575.1:576.851.5

INTEGRATION OF EUKARYOTIC DNA INTO BACTERIAL CHROMOSOME

Moscow GENETIKA in Russian Vol 21, No 2, Feb 85 (manuscript received 25 Apr 84)  
pp 201-209

BASHKIROV, V.I., KHASANOV, F.K., GLUMOVA, Ye.F., IRICH, V.Yu. and PROZOROV, A.A., Institute of General Genetics imeni N.I. Vavilov, USSR Academy of Sciences, Moscow

Abstract / Integration of the eukaryotic DNA frequent of Chinese Spring wheat into the bacterial chromosome (*Bacillus subtilis*) and production of a bacterial clone which persistently carries such DNA for many generations is described and discussed. Integration was realized by use of a specially constructed integrative vector, based on a temperature-sensitive plasmid. Localization of the inserted plasmid on the bacterial chromosome was determined. The site of integration of the plasmid DNA in the chromosome was located at the insertion of the wheat DNA fragment. Presence of the eukaryotic DNA in the bacterial chromosome did not disturb the reparation system of the bacterial cell. The integrative plasmid developed evidently will make it possible to integrate DNA of any origin into *Bac. subtilis*. Figures 4; references 18: 3 Russian, 15 Western.

I825-2791

UDC 575.11:576.851.5:576.858.9

STUDY OF PROCESS OF EXCISION OF INTEGRATED pBD12 PLASMID FROM BACILLUS SUBTILIS CHROMOSOME

Moscow GENETIKA in Russian Vol 21, No 2, Feb 85 (manuscript received 16 May 84) pp 229-238

SAVCHENKO, G.B., GLUMOVA, Ye. F. and PROSOROV, A.A., Institute of General Genetics imeni N.I. Vavilov, USSR Academy of Sciences, Moscow

Abstract / Behavior of pBD12 plasmid, integrated into *Bacillus subtilis* chromosome by means of homologous recombination is described and discussed.

Hybridization on filters showed that the plasmid is incorporated into the chromosome in 1 copy, which made the cell resistant to low concentrations of kanamycin and chloramphenicol. Clones which were more resistant to kanamycin arose with a frequency of  $5 \cdot 10^{-7}$ - $6 \cdot 10^{-6}$  in the cell. Most of these cells carried autonomous plasmid DNAs. Integration of a recE-gene into a strain with integrated plasmid reduced the frequency of occurrence of such clones by an order of magnitude of 2-3 and they did not contain autonomous plasmids. Restriction and hybridization analyses of some excised plasmids showed, most frequently, formation of plasmids which contain the part of pBD12 which corresponds to pUB110. One excision site was located, in most cases, in segment pC194 while another site may be located in the plasmid DNA or in the prophage of DNA bacterial chromosome. It was assumed that integration occurred at the terminal segment of prophage DNA on EcoRI fragments H and R. It is possible that the att-site of phage  $\phi$ 105 is located on the EcoRI B-fragment of its DNA. Figures 5; references 24: 2 Russian, 22 Western.

/I825-2791/

UDC 575.14:633.14

#### REACTION OF RYE POPULATIONS TO LOW LEVEL OF INBREEDING

Moscow GENETIKA in Russian Vol 21, No 2, Feb 85 (manuscript received 16 Feb 84)  
pp 274-282

GONCHARENKO, A.A., Scientific Research Institute of the Central Regions of the Non-Chernozem Zone, Moscow Oblast

[Abstract] Study of the reaction of rye to a low level of inbreeding was carried out on the basis of 6 families from the hybrid combination of F<sub>4</sub> Saratovskaya 4XVoskhod 1 and use of the method of combinations with procurement of 62 populations with different number of parental families (from 1 - 5) and low level of inbreeding F=12.81, 6.56, 4.48, 3.34 and 2.81 percent. Inbred depression in populations rising from the same family, in comparison with the starting family, was 65.3 percent for weight of grain from a plant, 82.4 percent grain yield, 90.2 percent overwintering of plants, 91.6 percent weight of 1000 grains, 94.7 percent length of stem and 95.3 percent number of flowers in the ear. Level of inbreeding in the populations decreased in proportion to the increase of the number of parental families, the level of inbreedings in populations decreased and differences between them levelled off while populations originating from the 5 families did not reach the level achieved in the starting variety. There was high sensitivity to inbreeding of such characters as grain yield, productive shrubiness, weight of grain from a plant and slight sensitivity to characters such as the stem length, weight of 1000 grains and number of flowers in an ear. There was a linear correlation between the low level of inbreeding and the characters studied. An increase of inbreeding by 1 percent reduced grain yield by 0.43 centners/hectare or 1.2 percent. A differentiating effect of low level inbreeding and the leveling effect of the number of parental families were noted. Figures 2; references 26: 9 Russian, 17 Western.

/I825-2791/

INDUCTION OF HOMEOLOGOUS PAIRING IN WHEAT X RYE WITH AID OF ph MUTANT

Moscow GENETIKA in Russian Vol 21, No 2, Feb 85 (manuscript received 28 Mar 84) pp 288-294

SHNAYDER, T.M., Institute of Experimental Biology, EstSSR Academy of Sciences, Tallinn

Abstract Results of analysis of meiosis in  $F_1$  hybrids obtained from crossing soft wheat *T. aestivum* L. em. Thell. with *Secale cereale* L. rye with use of ph mutant are presented and discussed. Participation of a ph mutant in inter-generic crossing produced wheat-rye hybrids with a changed meiosis process and formation of many bivalents and multivalents in the first fission of meiosis which may be associated with conjugations of homeologous chromosomes. The role and importance of the rye genotype in formation of the wheat-rye hybrid and its effect on cytogenetic features of the hybrid, especially of the course of meiosis, was shown. There was noted bivalent conjugation with formation of a few univalents and comparatively many multivalents in intraspecies soft wheat hybrids with participation of ph mutant. Crossing of various forms of wheat, carrying the ph gene, with rye revealed asyndetic meiosis typical for wheat-rye hybrids, with formation of 28 univalents. Figures 2; references 35: 5 Russian, 30 Western.

I825-2791

DISTRIBUTION PATTERNS OF  $Gd^-$  ALLELES IN SOME ETHNIC GROUPS OF USSR

Moscow GENETIKA in Russian Vol 21, No 2, Feb 85 (manuscript received 14 Mar 84; final draft received 25 May 84) pp 306-315

KRASNOPOLO'SKAYA, K.D. and SHATSKAYA, T.L., Institute of Medical Genetics, USSR Academy of Medical Sciences, Moscow

Abstract Study of the frequency and spectrum of  $Gd^-$  alleles in Russian, Ashkenazi Jews and Azerbaijan students of similar age and sex composition is described and discussed.  $Gd^-$  frequency was 0.36 percent in the Russian group, 0.91 percent in the Ashkenazi group and 3.6 percent and 10.5 percent in 2 AzSSR populations far removed from one another. G6PD deficiency in the Russian groups is familiar in form while that of the Ashkenazi group is represented by class II alleles which do not affect the viability of hemizygotes in the absence of provoking factors. G6PD deficiency in the AzSSR groups is represented by a wide spectrum of class II and class III alleles which do not affect the viability of their hemizygotic carriers. Formation of the spectrum was caused by the effect of the malarial factor of selection over hundreds of years and the high degree of separation of the populations studied. References 27: 19 Russian, 8 Western.

I825-2791

UDC 575.579

POPULATION DEMOGRAPHIC STUDY OF TURKMEN TEKE

Moscow GENETIKA in Russian Vol 21, No 2, Feb 85 (manuscript received 18 Apr 84) pp 316-320

KALMYKOVA, L.G., DYUKOV, V.A., IBRAGIMOVA, R.A., SHUMOVA, T.Ye. and OSINA, N.S., Institute of General Genetics, N.I. Vavilov, USSR Academy of Sciences, Moscow

Abstract Population and demographic study of the population of the village of Yangi-Kala in Geok-Tepinskiy Rayon of Ashkhabad Oblast involved 3528 of the approximately 5000 inhabitants and included study of the number and age-sex structure, reproductive period and family size, ethnogeneric composition, aspects of determination of marital partners and geographical migration. The population growth rate is high with an average of 6.17 children being born to one woman, the population is highly endogamous and the traditional marriage system is being preserved with 91.9 percent of marriages being intrageneric and 8.1 percent being intergeneric. Migration does not affect the endogamy level to any great extent. References 4 (Russian).

1825-2791

UDC 575.591

MEDICO-GENETIC STUDY OF KHANTY POPULATION OF OVGORT VILLAGE SOVIET OF YAMALO-NENETS AUTONOMOUS OKRUG

Moscow GENETIKA in Russian Vol 21, No 2, Feb 85 (manuscript received 18 Apr 84; final draft received 20 Jul 84) pp 332-337

PUZYREV, V.P., ABANINA, T.A., NAZARENKO, L.P., LEMZA, S.V., OSTETSOVA, O.A., GALAKTIONOV, O.K., PANFILOV, V.I. and SALYUKOV, V.B., Tomsk Section of the Institute of Medical Genetics, USSR Academy of Medical Sciences, Siberian Branch of the All-Union Oncological Center, USSR Academy of Medical Sciences, Tomsk

Abstract Results of a medical and genetic study of the Khanty population of the Northern Ob showed a rather high index of isolocal endogamy (0.54) and a low inbreeding coefficient (0.0011). There is low incidence of diseases with autosomal-recessive type of inheritance while forms of diseases with polygenic type of inheritance predominate among the nosological forms of hereditary pathology. Diabetes mellitus is very rare while pathology involving refractogenesis is common, which may be due to environmental factors or to hereditary factors. References 15: 13 Russian, 2 Western.

1825-2791

UDC 575.1:576.851.48

MAINTENANCE STABILITY OF pBR322 AND pBR327 VECTOR PLASMIDS IN ESCHERICHIA COLI CELLS AFTER MULTIPLE SOWINGS

Moscow GENETIKA in Russian Vol 21, No 2, Feb 85 (manuscript received 9 Apr 84; final draft received 17 Jul 84) pp 344-346

POTAPOVA, I.A., REPIN, V.Ye. and SHCHELKUNOV, S.N., All-Union Scientific Research Institute of Molecular Biology, Novosibirsk Oblast

Abstract Study of the stability of pBR322 and pBR327 plasmids in Escherichia coli CSH54 cells after multiple sowings in a liquid nutrient medium without selection pressures for plasmid markers of resistance to antibiotics showed that plasmid pBR327 is maintained in E. coli CSH54 cells more stably than plasmid pBR322. There was a reliable difference of some randomly selected clones, containing one and the same plasmid, in stability of maintaining plasmid DNA. These clones could not be recovered from pBR327 with the use of acridine orange. pBR327 showed more promise as a vector than did pBR322. It was assumed that the high maintenance stability of the plasmid and the impossibility of recovering cells containing this plasmid correlate with and are determined by the cell functions. Figure 1; references 6: 2 Russian, 4 Western.

I825-2791

UDC 575.591

HAPTOGLOBIN TYPES AMONG WESTERN KAZAKHSTAN POPULATION AND THEIR INTERACTION WITH SOME HUMORAL FACTORS OF BODILY RESISTANCE

Moscow GENETIKA in Russian Vol 21, No 2, Feb 85 (manuscript received 26 Mar 84; final draft received 18 Jul 84) pp 347-349

KASENOV, K.V. and SUNDETOV, Zh.S., Faculty of Pathological Physiology, Aktyubinsk State Medical Institute

Abstract Results of a study of distribution of types of haptoglobin among the Kazakhstan population are presented and discussed. Haptogen level in persons with different variants of it and the blood level of such factors of resistance of the body as the complement, muramidase and hemolysins were studied in 803 healthy persons ranging in age from 20-55 years, including 359 Kazakhs and 444 Russians. Hp 1-1 phenotype was found in 20.4 percent of the Russians and in 18.1 percent of the Kazakhs; Hp 2-1 phenotype was found in 49.3 percent of the Russians and 49.3 percent of the Kazakhs and HP 2-2 phenotype was found in 29.6 percent of the Russians and 32.6 percent of the Kazakhs. The frequency of Hp<sup>1</sup> and Hp<sup>2</sup> genes is 0.455 and 0.429 and 0.545 and 0.571 for the Russians and Kazakhs respectively. A correlation was established between the type of haptoglobin and the hemolysins level. There are more of the latter in persons possessing the Hp 3 gene, especially when in the homozygotic state. References 6: 3 Russian, 3 Western.

I825-2791

UDC 575.24:599.323.4

STATISTICAL ANALYSIS AND PLANNING OF EXPERIMENTS IN TESTS OF INDUCTION OF ANOMALOUS MOUSE SPERMS

Moscow GENETIKA in Russian Vol 21, No 1, Jan 85 (manuscript received 27 Dec 83)  
pp 54-59

BOBRINEV, Ye. V. and REVAZOVA, Yu. A., Scientific Research Institute of Biological Evaluations of Chemical Compounds, Moscow Oblast

Abstract Since 1975 induction of anomalous mammalian sperms was used in evaluating genetic activity of chemical compounds. A critical analysis was given of earlier methods used in treatment of experimental results. An attempt was made to improve analysis of experimental data obtained from this text. To verify possible genetic activity of a large number of chemical compounds, a novel way of analyzing experimental data was proposed based on the use of a consecutive schematic for microscopic preparations which was more convenient and economical than the methods used in the past. Inequality formulas were presented permitting termination of experiments after a certain critical point were calculated from them. References 12: 6 Russian, 6 Western.  
[1824-7813]

UDC 575.591

MEDICAL-GENETIC STUDIES OF KOSTROMSKAYA OBLAST POPULATION. COMMUNICATION 1. HEREDITARY DISEASES BURDEN ON POPULATION

Moscow GENETIKA in Russian Vol 21, No 1, Jan 85 (manuscript received 6 Feb 84)  
pp 153-160

GINTER, Ye. K., REVAZOV, A.A., TALANOV, M.I., NECHOLODOVA, O.L., KHLEBNIKOVA, O.V., LUKASHEVA, I.D., BYALIK, M.A., MIKHAYLOVA, L.K., and ASANOV, A. Yu., Institute of Medical Genetics, USSR Academy of Medical Sciences, Moscow

Abstract Dynamics of the hereditary diseases burden on populations within different structures is one of the most important problems in medical genetics. In the present paper a report is presented on distribution of hereditary diseases in five areas of Kostromskaya oblast: Buyskiy, Makar'yevskiy, Neyskiy, Soligalicheskiy and Galichskiy rayons. Using segregation analysis (considering the likelihood of registration) it was shown that it was correct to subdivide the material according to the type of inheritance. The burden of hereditary diseases (autosomal dominant, autosomal recessive and X-linked recessive) on the population was evaluated. Data obtained from this study were compared with data from other populations. An assumption was expressed about a relatively constant burden of inherited diseases among human populations. References 14: 6 Russian, 8 Western.  
[1824-7813]

INHERITANCE OF INSTABILITY IN LEUCINE-DEPENDENT AUXOTROPHIC BACILLUS SUBTILIS INDUCED BY HERRING DNA

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B. GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 85 (manuscript received 15 Jun 84) pp 69-72

KARPOVA, I.S., Institute of Molecular Biology and Genetics, Ukrainian SSR Academy of Sciences, Kiev

Abstract Long-term cloning studies were conducted with a  $leu^-$  auxotrophic *Bacillus subtilis* mutant, designated Lys 42 Leu 5-3, that showed unstable inheritance with a reversion frequency of ca. 30-80%. The mutant had been derived by treatment of a *B. subtilis* culture with herring DNA. Repeated cloning on complete agar medium (Hottinger) showed that a high degree of instability (20-70%) was retained in the course of some 500 generations, with considerable spread among clones and generations. These findings were ascribed to persistence of foreign DNA fragment(s) that somehow destabilized the bacterial genome. Figures 2; references 7: 6 Russian, 1 Western.

I840-12172

CLONING AND EXPRESSION OF STRUCTURAL GENE OF CLOSTRIDIUM THERMOCELLUM F7 CELLULOLYTIC COMPLEX ENDOGLUCANASE IN ESCHERICHIA COLI K12 CELLS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 281, No 4, Apr 85 (manuscript received 5 Sep 84) pp 963-965

PIRUZYAN, E.S., MOGUTOV, M.A., VELIKODVORSKAYA, G.A. and AKIMENKO, V.K., Institute of Molecular Genetics, USSR Academy of Sciences, Moscow; Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast

Abstract A study aimed at creation of a bank of genome DNA of strain *Clostridium thermocellum* F7 in *E. coli* and selection of clones containing genes of the cellulolytic complex is described and discussed. Catalytic activity was determined by use of a lysate of cells produced by ultrasound processing of a biomass grown overnight on L-broth. Lysates of cells containing plasmid pCU101 reduced the viscosity of carboxymethyl cellulose and hydrolyzed crystalline cellulose 411 but did not affect crystalline cellulose 311 showing that the product of the cloned gene is typical endoglucanase. After complete analysis of the bank, 5 clones which reveal the carboxymethylcellulose phenotype were selected. Lysates of the most active clones had 0.12 activity according to formation of reducing sugars. Restriction analysis of the recombinant plasmids obtained showed that genes of at least 2 different endoglucanases were cloned. The other plasmids contain nucleotide sequences overlapping them. Two clones containing the gene of beta-glucosidase of *C. thermocellum* were selected from the bank obtained. Figure 1; references 9: 8 Russian, 1 Western.

I861-2791

HUMAN FACTORS

INSTRUMENT SETS FOR MEASURING OPERATORS' PHYSIOLOGICAL PARAMETERS

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 4, 19 Feb 85 p 8

[Gaydukov, Yu., correspondent]

[Abstract] The article reports on capabilities of new sets of instruments for measuring attention span, reaction time and other physiological parameters of equipment operators which have been developed by specialists of the USSR Ministry of the Communications Equipment Industry. The work has been nominated for the 1985 USSR State Prize. There are reportedly five sets of apparatus consisting of 25 instruments which measure 129 parameters.

A photograph is given showing a test subject seated at a set called the "Elektronika NTs Tonus", which is intended for automatic assessment of the working fitness of operators and predicting suitability of job candidates for operation of equipment. The set is contained in an ordinary-size attache case.

FTD/SNAP  
CSO: 1840/1878

UDC 615.399:594.124.017:615.37.015.46:612.017.1

IMMUNO-STIMULATING ACTIVITY OF BIOLYCOGANS IN INDO-PACIFIC SEA MOLLUSKS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian  
No 3, Mar 85 pp 121-122

[Article by R. G. Ovodova, Yu. N. Loyenko, N. G. Prokof'yeva, N. A. Komandrova, O. D. Novikova and Yu. S. Ovodov, Pacific Ocean Scientific-Research Institute of Bioorganic Chemistry, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok]

[Text] Marine invertebrates are of significant interest as sources of highly varied physiologically active substances. Previously we identified and described biolycocans from a number of invertebrates in the Sea of Japan. The purpose of the present work is to study the potential capability of biolycocans in marine mollusks to stimulate immunogenesis in response to thymus-dependent antigen -- sheep erythrocytes (SE) and the phagocytic activity of the reticulo-endothelial system (RES) of intact mice.

The immuno-stimulating activity of the following species of mollusks was investigated: *Tridacna squamosa*, *Ostrea cristagalli*, *Spondylus varians*, *Cassis cornuta*, *Charonia tritonis*, *Conus litteratus*, *Conus leopardus*, *Chicoreus ramosus*, *Turbo marmoratus*, *Turbo argyrostomus*, *Bursa bubo*, and *Cypreae tigris*.

CBA breed mice, aged three to four months, and white mongrel mice, weighing 22 to 24 grams, were used in the experiment. The animals' immune response was rated by the number of antibody-forming cells (AFC) in the spleen as determined by the Cunningham local immune hemolysis method in the V. I. Kaledin et al. modification. The immunizing dose of SE was  $1 \times 10^8$  cells per mouse. The preparations were injected intraperitoneally 30 minutes before SE immunization. Each experimental group consisted of 6 CBA breed mice.

The RES phagocytic activity was found by measuring the clearance of carcass particles three, 24, and 72 hours after a single intraperitoneal injection of the test preparation. Six animals (white mongrels) were selected for the experiment, and the phagocytic index K was computed by the formula:

$$K = (\log C_1 - \log C_2) / T_2 - T_1$$

where  $C_1$  and  $C_2$  are the carcass concentrations at  $T_1$  and  $T_2$  times. The reliability of the results were checked by the Montsevichyute-Eringen method.

The isolated bioglycans were shown to have a high molecular weight (over 100,000) and highly varied ratios of carbohydrate and protein components that depended on the type of animal and the particular organ that was used as the source of the bioglycans. Almost all of the preparations used in the mice experiments turned out to have a low toxicity, i.e., the  $LD_{50} > 400$  mg/kg. Immuno-stimulating activity for various glycans was exhibited at doses ranging from 10 to 30 mg/kg. RES phagocytic activity increased by two to two and one-half times. The bioglycan from the *Cypreae tigris* cowrie was noted to have the most pronounced stimulating effect. The predominance of a carbohydrate or protein component in the bioglycan did not significantly affect the degree of the immunizing activity. A similar picture was found to be the case in rating RES phagocytic activity. Active bioglycans cannot be isolated from all of the mollusk's organs. The experimental results would seem to indicate that the RES -stimulating effect depends on the time of the preparation's administration. However, a tendency towards increased stimulation was primarily observed by 72 hours. The results presented in this study as well as data we have previously accumulated allow us to hypothesize that the ability to produce immuno-stimulating bioglycans is a property common to marine invertebrates.

Thus, bioglycans from marine mollusks possess distinct immuno- and RES-stimulating activity. The bioglycans are of a low toxicity which is of considerable practical interest.

The mollusks investigated in this study were collected during research cruises of the scientific-research vessel Professor Borogov in 1979 - 1981 on the coral reefs of the islands and atolls of the Democratic Republic of Madagascar, Mauritius, the Republic of Seychelles, the Republic of Maldives, the Kingdom of Tonga, and Western Samoa.

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6289

CSO: 1840/1849

UDC 615.371:579.861.27.065:616-056.437.07

SENSITIZING AND PROTECTIVE ACTIVITY OF STAPHYLOCOCCAL SOLUBLE ANTIGEN VACCINE  
IN RELATION TO ROUTE AND SCHEME OF ADMINISTRATION

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3,  
Mar 85 (manuscript received 10 Jul 84) pp 16-19

YEFREMOVA, V.N., KUZ'MINA, L.A. and MOSHIASHVILI, I.Ya., Central Scientific  
Research Institute of Vaccines and Sera imeni I.I. Mechnikov, Moscow

Abstract Guinea pigs were employed in a study on the effects of the route  
and scheme of immunization with soluble antigens of *Staphylococcus aureus*.  
The effects were analyzed in terms of sensitization via the PCA test and  
protection rendered against an intraperitoneal challenge with  $10^7$  cells of a  
virulent culture of *S. aureus*. The development of protective antibodies and  
sensitization were found to be dependent on the route of administration.  
Three immunizations via the intranasal route were just as effective as three  
subcutaneous immunizations in protecting the animals from virulent staphylo-  
cocci. However, the intranasal route was less likely to result in sensitization.  
Optimal results were obtained when the animals were initially  
immunized via the intranasal route and then followed with subcutaneous injec-  
tions of the soluble antigens. Combined immunization in which the routes of  
administration were reversed, i.e., first subcutaneous and then intranasal  
administration, resulted in more intense sensitization and a lesser degree of  
protection. In general, an inverse relationship prevailed between the  
intensity of the PCA test and the degree of protection afforded by the vac-  
cination. References 6 (Russian).

I848-12172

UDC 615.37.012.07

HETEROGENEITY OF AFFINITY OF MONOCLONAL ANTIBODIES

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 85 (manuscript received 3 Feb 84) pp 67-74

LEVI, M.I., Central Control and Research Laboratory, Moscow Disinfection Station

Abstract The common assumption that monoclonal antibodies are homogenous in terms of their association constants for their target ligand was tested in an indirect ELISA method, using monoclonal antibodies produced in BALB/c mice against the capsular antigen of the plague bacillus. Analysis of the binding plots obtained for 3 clones of IgG<sub>1</sub> antibodies showed that they can be classified into 5 categories based on their association constants, i.e., they demonstrated binding heterogeneity. The seeming homogeneity in less sensitive systems would appear to be due to failure to detect low affinity monoclonal antibodies. Figures 5; references 23: 7 Russian, 16 Western.

I848-12172

UDC 615.373.3:579.843.957.012(048.8)

'BASIC' SOMATIC ANTIGEN OR ANTIGENS PREPARED FROM YERSINIA PESTIS BY BOIVIN-MESROBEANOU METHOD

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 85 (manuscript received 12 Sep 83) pp 108-115

GRIBOYEDOV, A.V. and BARABASH, G.P., Rostov-on-Don Scientific Research Antiplague Institute

Abstract Considerable controversy exists in the literature as to the nature of the somatic O antigen of Yersinia pestis, and whether Boivin's trichloroacetic acid method is effective in the extraction of this antigen from the plague bacillus. Certain authors have claimed to have isolated the 'basic' somatic antigen, while others hold that a mixture of antigenic components are extracted by this process. Despite the disagreements as to the physicochemical characteristics and properties of the isolated material, many researchers have come to feel that the 'basic' somatic antigen represents the polysaccharide O antigen chain. The possibility, however, remains open that Y. pestis is incapable of synthesizing the complete O antigen, but merely produces an incomplete or defective product. References 75: 64 Russian, 11 Western.

I848-12172

EFFECTS OF PSEUDOTUBERCULOSIS LIPOPOLYSACCHARIDE ON MACROPHAGE FUNCTION

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKHOLOGIYA in Russian Vol 30, No 2, Feb 85 (manuscript received 26 Jun 84) pp 109-113

KUZNETSOVA, T.A., KOVALEVSKAYA, A.M., SANINA, O.P. and BESEDNOVA, N.N., Scientific Research Institute of Epidemiology and Microbiology, Siberian Department, USSR Academy of Medical Sciences; Pacific Institute of Bioorganic Chemistry, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok

Abstract Guinea pig peritoneal macrophages were used in a test on the effects of *Yersinia pseudotuberculosis* lipopolysaccharide (LPS) on macrophage function and ingestion of radio-labeled bacteria. In the in vitro studies, LPS in a concentration of 50-100  $\mu$ g/ml was toxic to the macrophages, but in a concentration of 1-10  $\mu$ g/ml enhanced phagocytosis of *Y. pseudotuberculosis*. Outbred mice pretreated with 1.25 mg/kg of LPS 1 h prior to i.p. infection with *Y. pseudotuberculosis* showed 2.4-fold greater uptake of the bacteria by peritoneal macrophages and twice as great retention of the microbial cells over a 6 day period, in comparison to the macrophages of untreated (control) mice. An even greater potentiation of phagocytosis was obtained by administration of LPS, 1 day before the infection. Similar trials conducted with *Staphylococcus aureus* demonstrated that the *pseudotuberculosis* LPS was far less effective as an immunostimulant. Thus, the *pseudotuberculosis* LPS appears to be an effective agent in stimulating cellular immunity against the homologous bacterium. References 7: 3 Russian, 4 Western.

/1862-12172/

NATURAL, LOW MOLECULAR WEIGHT IMMUNOMODULATORS

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKHOLOGIYA in Russian Vol 30, No 2, Feb 85 (manuscript received 23 Aug 84) pp 131-138

IVANITSKAYA, L.P., OPARINA, O.N., STEKHANOVA, T.N. and NAVASHIN, S.M., All-Union Scientific Research Institute of Antibiotics, Moscow

Abstract Among the various immunomodulators that have been described, low molecular weight agents derived from various classes of microorganism constitute a novel category. Generally, these compounds are small peptides (bestatin, corioline, amastatin, etc.) that may or may not also possess antimicrobial properties, such as enzyme inhibition. These compounds are currently undergoing intensive research to define and modify their spectrum of action and applicability. In addition, they and their derivatives are generally easy to produce by various chemical means, and lend themselves to

total laboratory synthesis. As a result, they are also of considerable commercial interest. References 34: 3 Russian, 31 Western.

1862-121727

UDC 615.339:578.2457.015.44:618-006.018.15-092.4

SIMPLE METHOD FOR ASSESSING ANTIPROLIFERATIVE ACTIVITY OF HUMAN INTERFERON

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKNOLOGIYA in Russian Vol 30, No 3, Mar 85 (manuscript received 13 Aug 84) pp 204-208

ASPETOV, R.D., SHAYKHINOVA, T.B., NOVOKHATSKIY, A.S. and SHURATOV, I.Kh., Institute of Virology imeni D.I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow; Scientific Research Institute of Epidemiology, Microbiology and Infectious Diseases, Kazakh SSR Ministry of Health, Alma-Ata

Abstract A simple microscopic technique was developed for the evaluation of different classes of human interferon for antiproliferative activity, which relied on inhibition of HeLa cell colony formation when cultured over a monolayer of human embryo fibroblasts. The degree of colony formation inhibition was visually assessed after 4-5 days of incubation at 37°C under 5% CO<sub>2</sub> and a relative humidity of 98%. The results showed that gamma-interferon was 30-times as effective as alpha- and beta-interferons, as well as the recombinant alpha-F and alpha-F/D interferons. In addition, exposure of the various classes of human interferon to pH 2.0 for 24 h or to 56°C for 30 min abolished antiproliferative activity of gamma-interferon only, leaving the other interferons unaffected. The antiproliferative activities of all interferon classes were inhibited by their specific antibodies. The technique devised here appears to have a broad potential in the evaluation of interferons, and possibly other agents, for antineoplastic activity.

Figures 1; references 15: 5 Russian, 10 Western.

1864-121727

UDC 615.277.3:579.8647.015.46.07

IMMUNOCHEMICAL STUDIES ON BLASTOLYSIN

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKNOLOGIYA in Russian Vol 30, No 4, Apr 85 (manuscript received 11 Nov 84) pp 277-281

BERSHADSKAYA, Ye. D., FIR, N.G. and OGARKOV, V.I., Immunochemistry Laboratory, All-Union Scientific Research Institute of Protein Biosynthesis, Moscow

Abstract In view of the potential clinical usefulness of blastolysin, a derivative of the cell wall of *Lactobacillus bulgaricus*, as an immunostimulant and oncolysin, studies were conducted on its antigenicity in outbred rabbits

and dogs. Using both subcutaneous and intravenous routes of immunization showed blastolysin to be weakly immunogenic in dogs with maximum titers of 1:64, and somewhat or more potent immunogen in outbred rabbits with titers in the 1:1280 to 1:6400 range in hemagglutination and gel diffusion tests. It also became apparent that the blastolysin preparations contained at least three major antigenic components, which elute in the first fraction (75-130 ml) from Sephadex G-75 columns (2 x 90 cm). The data demonstrated that blastolysin is antigenic, although relatively weakly and may require Freund's adjuvant for the formation of precipitating antibodies, and that this fact may account for it being biologically active only if given as a single injection. Furthermore, the findings also indicate that standard immunochemical techniques can be employed successfully in the standardization of blastolysin preparations. Figures 6; references 6: 4 Russian, 2 Western.  
/T865-12172/

UDC 615.339:578.2457.012.6

INACTIVATION OF NEWCASTLE DISEASE VIRUS IN PREPARATION OF PORCINE LEUCOCYTIC INTERFERON

Moscow ANTIBIOTIKI I MEDITINSKAYA BIOTEKHNOLOGIYA in Russian Vol 30, No 4, Apr 85 (manuscript received 2 Feb 84) pp 292-296

KUZNETSOV, V.P., PARFENOV, V.V., MONASTYREVA, L.A., ZUBANOVA, N.A., TKACH, T.A., VOLODINA, T.N., MARCHENKO, V.I. and POKIDYSHEVA, L.N., Institute of Epidemiology and Microbiology imeni N.F. Gamaleya, USSR Academy of Medical Sciences, Moscow

Abstract / Various procedures for the inactivation of Newcastle Disease Virus (NDV) were tested in methods used in the preparation of porcine leucocytic interferon (PLI). Standard techniques of adjusting the pH to 2.2-3.0 were seen to result in marked inactivation of PLI. An agent found useful in inactivating NDV without seriously affecting PLI activity was formalin, employed as a 0.1-0.2% solution for 4 h at 4°C, resulting in PLI preparation exhibiting interferon activity 5-fold greater than obtained with acid inactivation of the inducing virus. Further purification of the interferon with polyethylene glycol (1/10 to 1/20 v/v) promoted retention of interferon activity and elimination of formalin. PLI prepared in this manner was effective and nontoxic for diploid human fibroblast cultures. References 11 (Russian).  
/T865-12127/

EFFECTS OF BIOACTIVE AGENTS ON CATHEPSIN ACTIVITY IN RES CELLS

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKHNOLOGIYA in Russian Vol 30, No 2, Feb 85 (manuscript received 30 May 84) pp 106-109

POPOVA, G.O., SADOVSKAYA, L.Ya., MIKHALEVICH, Br. V., MISHAN'KIN, B.N. and MAKAROVSKAYA, L.N., Rostov Antiplague Institute

Abstract Guinea pigs and outbred mice were employed in a study on the effects of prodigiosin (10 µg, s.c.) or zymosan (200 µg, s.c.) on the activity of cathepsin D of peritoneal macrophages and splenocytes. In the guinea pig studies prodigiosin enhanced the activity of lysosomal cathepsin D in both types of cells, whereas zymosan failed to do so. However, the mice studies showed that such cells of animals pretreated either with zymosan or prodigiosin did not support multiplication of phagocytized Yersinia bacilli, as did cells derived from untreated control mice. It appears that both prodigiosin and zymosan affect and enhance certain immune mechanisms, other than cathepsin D, in protecting the animals from the plague bacillus.

References 18: 15 Russian, 3 Western.

1862-12172

## LASER EFFECTS

### LASERS IN SURGERY

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 7, 2-16 April, 1985, p 2

Article by O. K. Shobelkin, doctor of medical sciences, professor, head of the All-Union Center for the Use of Lasers in Surgery, USSR State Prize Laureate/

Extract A laser beam 'knows' not only how to cut biological tissues but also how to suture them. These capabilities were observed in quantum generators, and original methods have been developed at our center for operations on hollow organs with the aid of laser instruments, including a scalpel and a suturing apparatus.

More than 400 quantum generators are now operating in many of our country's hospitals and clinics. The most widely used laser units are the "Skal'pel'-1", "Romashka-1", "Romashka-2", "Yatagan" and "Razbor".

Physicists are helping us in this work. An erbium laser has been developed at the USSR Academy of Sciences' Physics Institute imeni Lebedev, for example. Together with associates of the USSR Academy of Medical Sciences' All-Union Cardiology Center, we are using this laser in experiments for improving the heart's blood supply in ischemic heart disease.

Burn surgery, skin-plastic and abscess surgery, photocoagulation of tumoral diseases of the gastrointestinal tract, the halting of gastrointestinal hemorrhages -- these are some of laser radiation's new fields of employment. Further expansion of the capabilities of laser medicine and diagnosis depends largely on developing a new generation of quantum generators with physical characteristics which will be still more attractive to medical personnel.

(A photograph is given showing the author holding a "Skal'pel'-1" unit.)

FTD/SNAP  
CSO: 1840/321

UDC 577.3

MODIFIED ARGON LASER IN MUTATION INDUCTION IN BARLEY

Minsk VYESTSI AKADEMII NAVUK BSSR: SERYYA BIYALAGICHNYKH NAVUK in Russian  
No 6, Nov-Dec 84 (21 Feb 84) pp 98-101

KHOKHLOV, I.V., VOLODIN, V.G., MOSTOVNIKOV, V.A., PLAVSKIY, V.Yu.,  
LISOVSKAYA, Z.I. and SHCHERBAKOV, Ye.I., Institute of Genetics and Cytology,  
Belorussian SSR Academy of Sciences

Abstract/ Modifications were introduced in the standard argon laser instrument LG-68 "Igla-4" to provide a more powerful laser source for induction of mutations in Intensivnyy barley. The changes involved inclusion of a high vacuum element ( $5 \times 10^{-7}$  mmHg) filled with spectrally-pure argon and improvements in the electrical supply module. The improvements and modifications resulted in an argon laser module capable of delivery of a 6 W output (rather than 1-2 W) for 100 to 2000 h. Laser irradiation of barley seeds yielded an incidence of phenotypic changes in  $M_2$  on the order of 6% after exposure to  $4 \times 10^3$  W/m<sup>2</sup> for  $1.8 \times 10^4$  sec. versus a figure of 4.9% for gamma-irradiation in a dose of 10,000 R. The modified argon laser was thus demonstrated to be as effective as gamma irradiation in the induction of potential mutagenic changes in barley, and may have utility in plant breeding. References 4 (Russian).

1873-12172

UDC 577.3

RNA-PROTEIN CROSS-LINKS IN 30S-SUB-PARTICLE OF *ESCHERICHIA COLI* RIBOSOME  
INDUCED BY ACTION OF HIGH INTENSITY LASER ULTRAVIOLET IRRADIATION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 281, No 4, Apr 85 (manuscript received 20 Jul 84) pp 971-974

RUDOVSKIY, E.I., AKSENT'YEVA, M.S., ABDURASHIDOVA, G.G., SIMUKOVA, N.A.  
and RUBIN, L.B., Institute of Biorganic Chemistry imeni M.M. Shemyakin, USSR  
Academy of Sciences; Institute of Nuclear Physics, Moscow State University  
imeni M.V. Lomonosov, Moscow

Abstract / Action of low-intensity ultra-violet radiation (NIUF, intensity less than  $10^{18} \text{kv} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ ) on nucleoproteins induces nucleotide cross-links as a result of reactions of nucleic bases in lower electron excited states with adjacent amino acid residues of the proteins /SHETLAR, 1980/. Formation of such cross-links is used widely to study the structure and function of multicomponent nucleotides /SCHIMMEL et al. 1977; GUDOVSKIY, 1982/. In relation to this, this paper demonstrates that, under the effect of laser ultraviolet radiation ( $I_0 > 10^{17} \text{kv} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ , 266 nm) on 30S sub-particle of *E. coli* ribosome, consisting of 1 molecule of 16S-Rna and the 21st protein, the effectiveness of cross-linking of the proteins to RNA depends on the intensity of light flow and is at almost 2 orders of magnitude higher than that under the effect of low-intensity ultra-violet radiation ( $I \approx 10^{15} \text{kv} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ , 254 nm). Dose dependences of the degree of cross-linking of proteins of the 30S-sub-particle to 16S-RNA are linear under the effect of both laser radiation and low-intensity radiation. Under the effect of NIUF, effectiveness of cross-linking does not depend on radiation intensity. Under the effect of laser radiation, effectiveness of cross-linking increases in proportion to increase of intensity and even at  $I = 1.6 \cdot 10^{24} \text{kv} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$  the effectiveness of cross-linking is 1 order of magnitude greater than that under the effect of NIUF. Thus, under the effect on the 30S sub-particle of *E. coli* ribosome of laser radiation with  $I > 1.6 \cdot 10^{24} \text{kv} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ , more than 90 percent of cross-linking results from biquantum processes. Figures 2; references 15 (Western).

/1861-2791/

MEDICINE

HIGH-TECH MEDICAL EQUIPMENT AT MEDICAL TECHNOLOGY SOCIETY

Kiev PRAVDA UKRAINY in Russian 19 Apr 85 p 4

/Article by Yu. Vilonskiy/

/Excerpt/ The fourth plenary session of the Ukrainian republic board of the All-Union Medical Technology Society, which was held in Kiev, was devoted to prospects for improving general medical examination of the public and disease prevention.

"Much initiative is being shown by prominent scientists who are working in new directions," said Professor V. G. Bazarov, chairman of the society's republic board and a Ukrainian SSR State Prize laureate. "New technology has been introduced in Khar'kov under the direction of L. T. Malaya, member of the USSR Academy of Medical Sciences, for example. This technology facilitates early diagnosis of heart disease in general medical examinations of the public. The safety of complex surgery has been greatly heightened thanks to original refrigeration equipment. Its development is headed by A.A. Shalimov, member of the Ukrainian Academy of Sciences. V.I. Grishchenko, corresponding member of the Ukrainian academy and head of a chair of instruction of the Khar'kov Medical Institute, is working actively on applications of cryogenic technology in the treatment of female diseases.

"I should like to say a few things about the geography of this work, which graphically reflects the enlistment of major groups of engineering and scientific personnel in the research. "Radioelectronic Medical Apparatus for Examination" was the subject of a report by A. G. Tishchenko, general director of the L'vov Radioelectronic Medical Apparatus Research and Production Association. An instrument-complex which provides an 'instant portrait' of health has been developed at the Donetsk Medical Institute. Experience with the use of computer systems for solving problems of therapy and preventive medicine in Khar'kov was shared by Professor Ya. Ye. Ayzerberg, head of a chair of instruction of the Khar'kov Aviation Institute and a Lenin Prize laureate, and Yu. T. Murav'yev, docent of this institute. A. Yu. Ratmanskiy, laureate of the USSR and Ukrainian SSR state prizes, told about a new microprocessor apparatus for cardiology."

FTD/SNAP  
CSO: 1840/321

UDC 615.355:577.152.17.03

EXPERIMENTAL SUBSTANTIATION OF CLINICAL USE OF BLOOD ENZYME PREPARATION  
CERULOPLASMIN

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 1, Jan 85  
(manuscript received 07 Dec 83) pp 22-27

PINCHUK, V. G., BERDINSKIKH, N. K. and VOLOSHCHENKO, Yu. V., Institute of Oncology Problems imeni R. Ye. Kavetskiy, Ukrainian SSR Academy of Sciences; Kiev Enterprise for Production of Bacterial Preparations, USSR Ministry of Health

Abstract / Although human serum ceruloplasmin, a deep blue protein in the alpha<sub>2</sub>-globulin serum fraction, is being used clinically abroad, no ceruloplasmin preparation has been designated for clinical use and industrial production in the USSR. The biological activity of ceruloplasmin has been studied, and a simple and efficient process for production of ceruloplasmin from wastes of gamma-globulin production has been proposed. Preclinical studies of the preparation were conducted according to the requirements of the Pharmacological Committee of the USSR Ministry of Health. Ceruloplasmin was essentially not toxic: long-term use produced no changes in vital systems and organs. No changes were noted in blood morphology in rabbits receiving 10 mg of ceruloplasmin/kg of body weight for 2 months except for elevated hemoglobin at 2 months, elevated red cell count at 1 and 2 months, and elevated reticulocyte count at 1 month. Similar results were obtained in rats. These findings indicate that ceruloplasmin can stimulate hemopoiesis. Ceruloplasmin exhibited some antineoplastic activity in experimental tumors in rats and mice: Guerin carcinoma, Shvetz leukemia, Lewis lung carcinoma, Ehrlich carcinoma, NKLy lymphoma, sarcoma 180, and leukemia L-1210. Tumor growth inhibition varied from 20 to 50%; tumor growth stimulation was not observed. Combined use of ceruloplasmin and cyclophosphane, an antineoplastic agent, in mice with sarcoma 180 and in rats with Guerin carcinoma revealed that ceruloplasmin did not suppress the antineoplastic activity of cyclophosphane but rather enhanced it slightly. Experiments in rats with Guerin carcinoma treated with cyclophosphane and ceruloplasmin revealed no decline in red cell and platelet counts, as occurred in control, but rather an increase in these counts. Ceruloplasmin significantly increased blast transformation activity in lymphocytes (2.5-fold versus control and 2-fold versus zymosan treatment) in C57Bl mice in a model of Lewis lung carcinoma. Although the mechanism of

the immunopotentiating activity is not known, ceruloplasmin perhaps intercepts superoxide radicals and thus reduces the toxic effect of tumors on the body. Oxidation of ceruloplasmin by 5-hydroxytryptamine and catecholamines may also be a factor. Ceruloplasmin also exhibited anti-inflammatory activity in acute formalin-induced inflammation in rats. These findings suggest that ceruloplasmin can be recommended for the treatment of anemia and inflammations and for complex therapy of malignant tumors to stimulate hemopoiesis and to reduce immunosuppression caused by radiation and chemotherapy. References 16: 4 Russian, 12 Western.

I747-9307/

UDC 615.332.033.014.6:615.385.1

#### SEALED AUTOLOGOUS ERYTHROCYTE GHOSTS IN ANTIBIOTIC DELIVERY

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKHOLOGIYA in Russian Vol 30, No 2, Feb 85 (manuscript received 13 Jul 84) pp 101-102

GENING, T.P., YELISEYEVA, A.P. and POTATURKINA-NESTEROVA, N.I., Semipalatinsk Medical Institute

Abstract To further expand the armamentarium of drug delivery systems, studies were conducted with sealed erythrocyte ghosts of outbred rats as a vehicle for the transport of antibiotics (tetracycline HCl, oxytetracycline HCl, morphocycline, rubomycin). The ghosts were sealed in 25 µg/ml antibiotic solutions, and tested for leakage either in Hank's solution or serum at pH 7.36 at 37°C with erythrocyte ghost:titrating solution ratio of 1:10 (v/v). The level of incorporation of a given antibiotic ranged from 6.9 to 8.9%. Tested by both systems, only trace quantities of leakage were seen after 30 min of incubation, and no leakage after 45 min. Erythrocytic ghosts appear to be suitable for the further testing of their potential as drug-delivery vehicles for antibiotics. References 6: 5 Russian, 1 Western.

I862-12172/

UDC 59.089.843:591.089.84:612.8

#### BRAIN TISSUE TRANSPLANTATION AND RESTORATION OF FUNCTIONS

Moscow USPEKHI SOVREMENNOY BIOLOGII in Russian Vol 99, No 1, Jan-Feb 85, pp 123-140

POLEZHAYEV, L.V., Institute of General Genetics imeni N.I. Vavilov, USSR Academy of Sciences, Moscow

Abstract Discussion of data from the recent literature (reports of results of experiments conducted in 1980-1983) concerning transplantation of embryonal tissue into the brain and spine of mammals indicates the possibility of

successful allotransplantation and, sometimes, xenotransplantation of embryonal tissue into mammal brain in spite of immune reactions of astrocytes of recipients. The data indicate a high capacity for axonal growth of cerebral and spinal neurons. The significance of trophic interaction of various sections of the brain and neurotrophic factors is discussed. Transplantation of embryonal brain tissue makes it possible to restore some impaired functions in mammals. Findings in relation to Parkinsonism, memory impairment, diabetes insipidus, sexual dysfunction, impairment of vision, effect of x-radiation on the brain, spinal injury and dystrophy of neurons of the cerebral hemispheres due to hypoxia are discussed. References 131: 18 Russian, 113 Western.

/I869-2791/

UDC 591.481:616.089.843.092-032:611.013

TRANSPLANTATION OF HUMAN EMBRYO CEREBRAL CORTEX TISSUES INTO BRAIN OF ADULT MAMMALS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 281, No 4, Apr 85  
(manuscript received 14 Aug 84) pp 952-953

OTELLIN, V.A., GURCHIN, F.A., GILEROVICH, Ye.G., GUSIKHINA, V.I., Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad

[Abstract] Possibility of transplantation of human embryo neocortex into the depth of the associative region of adult animal cerebral cortex was studied in long-term experiments which make it possible to judge, definitely, the survival of such transplants for 6 months for rats and for 8 months for monkeys and to assess the characteristics of the transplant. The post-surgery behavior of the animals after such transplantations differed according to the gravity of the operations; rats displayed increased motor activity while monkeys showed no significant behavioral changes. Morphological studies of the brain of the animals were performed at different times after surgery. Part of the human embryo neocortex transplants was incorporated into the brain matter of the rats within 6 months and of the monkeys within 8 months. There was noticeable differentiation of all cellular elements, growth of axons and dendrites and formation of synaptic contacts in them. Signs of chronic inflammation or a slight immune reaction was noted in some parts of other transplants. The rise of these reactions and their possible connection with the degeneration process or with conditions of the experiments require special study. Data obtained provide new opportunities for study of mechanisms of human brain development, establishment of nerve centers and inter-neuronal connections which may improve prognoses concerning clinical use of embryonal nerve tissue transplants. Figures 4; references 11: 4 Russian, 7 Western.

/I871-2791/

UDC 575.24:576.858.9

ISOLATION AND ANALYSIS OF PSEUDOMONAS AERUGINOSA PAO MUTANTS RESISTANT TO  
NONLYSOGENIZING BACTERIOPHAGES

Moscow GENETIKA in Russian Vol 21, No 1, Jan 85 (manuscript received 5 Mar 84;  
after final revision 14 May 84) pp 39-45

KULAKOV, L. A., MAZEPA, V. N. and BORONIN, A. M., Institute of Biochemistry  
and Physiology of Microorganisms, USSR Academy of Sciences, Moscow Oblast;  
Gor'ki Scientific Research Institute of Epidemiology and Microbiology

Abstract In connection with possible industrial and clinical applications,  
the stability of *P. aeruginosa* bacteria towards specific bacteriophages is of  
great interest. In the present study, mutants of *P. aeruginosa* Pao, resistant  
to a number of nonlysogenizing phages, were isolated. On the basis of the  
morphology of negative colonies, these phages were divided into three groups:  
 $\emptyset$ k,  $\emptyset$ m and  $\emptyset$ mn. On the basis of the data obtained on cross stability of *P.*  
*aeruginosa* mutants, a schematic for its adsorption specificity was proposed.  
It was shown that bacteriophages  $\emptyset$ k and  $\emptyset$ m utilized different receptors for  
adsorption on the bacterial cell surface. The adsorption receptors of the  
phages  $\emptyset$ m and  $\emptyset$ mn were related to each other in a very specific way: the  
receptor of  $\emptyset$ m phages consists of structures required for adsorption of the  
 $\emptyset$ mn phages; changes in any of these structures due to mutation result in an  
inability of the  $\emptyset$ m phages to be adsorbed on the cell surface. Figure 1;  
references 10: 5 Russian (1 by Western author), 5 Western.

1824-7813

LYSOSOMAL INVOLVEMENT IN STAPHYLOCOCCAL INFECTION OF FIBROBLASTS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 85 (manuscript received 6 Feb 84) pp 13-16

DZHIDZHEISHVILI, L.Sh., KORINTELI, V.I., MEYPARIANI, A.N., CHANISHVILI, T.G., SHARMAZANASHVILI, T.I., GIORKHELIDZE, D.D. and KULIYEV, V.A., Tbilisi Scientific Research Institute of Vaccines and Sera

Abstract / The significance of lysosomal permeability to fibroblast pathology resulting from staphylococcal infection was studied in a system involving chick embryo fibroblast culture infected with staphylococci isolated from human pyogenic infections. Analysis of the histochemical and ultrastructural data demonstrated that lysosomal membrane patency had a significant effect in fibroblast damage and destruction. Rapid destruction of the fibroblasts by the virulent staphylococci proceeded concomitantly with the release of lysosomal hydrolases into the cytoplasm, indicating that the latter phenomenon also contributed to cell death. Stabilization of the lysosomal membranes by the addition of cortisone to the culture medium markedly attenuated the pathogenic process, which was further controlled by the addition of bacteriophages for control of the pathogenic agents. Thus, lysosome activation on penetration of the staphylococci into the fibroblast cytoplasm appears to have a dual potential. One is to destroy the pathogenic bacterium, while the other corollary is to damage host cell. Figures 3; references 12: 6 Russian, 6 Western.

/T848-12172/

INDUCTION AND ULTRASTRUCTURE OF UNBALANCED GROWTH FORMS IN LISTERIA

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 85 (manuscript received 14 Feb 84) pp 19-23

ZIGANGIROVA, N.A., KONSTANTINOVA, N.D., PROZOROVSKIY, S.V. and KATS, L.N., Scientific Research Institute of Epidemiology and Microbiology imeni N.F. Gamaleya, USSR Academy of Medical Sciences, Moscow

Abstract / Studies were conducted on the induction of unbalanced growth forms of Listeria monocytogenes HK by different chemical and physical factors, to determine similarities and differences in terms of ultrastructure, viability and reversion to parental type. Studies with penicillin showed that with a dose of 100  $\mu$ g/ml in a culture in the logarithmic phase of growth, unbalanced growth forms were obtained completely lacking a cell wall or cytoplasmic membranous structures. The forms were viable and readily converted to L-forms on subculture. Penicillin was bactericidal in doses of 150-200  $\mu$ g/ml. Logarithmic culture exposed to 1 or 1.5 M LiCl also yielded viable unbalanced growth forms with various degrees of cell wall and cytoplasmic membrane damage.

On subculture, no conversion to L-forms was evident, but reversion to the original bacterial form was the rule. Irradiation with 100 and 150 erg/mm<sup>2</sup> UV light also yielded unbalanced growth forms with altered nuclear and ribosomal structures, with reversion to original form and no L-form formation. The reasons for the failure of L-forms to arise with LiCl and UV irradiation remain unclear. Figures 6; references 16: 9 Russian, 7 Western.

/T848-12172/

UDC 579.8.083.13:546.72(048.8)

#### IRON AND BACTERIAL PATHOGENICITY

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 85 (manuscript received 23 Nov 83) pp 103-108

GORLINA, M.Kh., Scientific Research Institute of Epidemiology and Microbiology imeni N.F. Gamaleya, USSR Academy of Sciences, Moscow

Abstract A review of largely Western literature is presented on the role and significance of iron in bacterial pathogenicity. The review approaches the problem from the contribution that host iron and its metabolites and carrier proteins make to the survival and metabolic activity of the pathogen, and proceeds to analyze the metabolic role of iron in bacteria and its influence on toxin production and microbial viability. A list is provided of the various mechanisms that bacteria use to assimilate and store iron and of the various carrier systems that they have evolved. Gram negative bacteria have been divided into four categories depending on whether exogenous iron contributes or detracts from their virulence, or has no effect. In addition, host iron balance also has been shown to affect immunity. For example, it has been demonstrated that improper iron concentration can inactivate lysosomal enzymes in phagocytes, while iron-binding proteins have been shown to interact with antibodies in activating complement. References 71: 4 Russian, 67 Western.

/T848-12172/

UDC 616.98:578.8:579.267-036.20

#### PSYCHROPHILY OF PATHOGENIC MICROORGANISMS AND ITS EPIDEMIOLOGICAL AND PATHOGENETIC SIGNIFICANCE

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 1, Jan 85 (manuscript received 24 Feb 84) pp 58-65

SOMOV, G.P., Institute of Epidemiology and Microbiology, Siberian Department of the USSR Academy of Medical Sciences, Vladivostok

Abstract According to the first law of epidemiology, psychrophily is typical for saprophytes living in the environment but not for pathogenic

microorganisms, since the body temperature of warm-blooded animals is optimal for their growth. Data have been obtained, however, which contradict this. *Yersinia pseudotuberculosis* and *Y. enterocolitica* are both pathogenic and psychrophilic in that they multiply and retain all antigenic and biological, including pathogenic, properties at 4-12°C. It is hypothesized that the psychrophily of *Y. pseudotuberculosis* is beneficial for the microorganism, since epidemics occur at low temperatures which are favorable for growth and multiplication. This hypothesis is supported by the following facts. Morbidity is especially high in peripolar regions, and epidemics occur more often in winter and spring. *Y. pseudotuberculosis* is ubiquitous and found commonly in the environment. Pure *Y. pseudotuberculosis* cultures are best isolated at 4°C, and the organism has also been frequently isolated from ectothermal animals. Studies showed that 97% of *Y. pseudotuberculosis* infections were due to ingestion of food products stored at 4-7°C, and the organism multiplied actively on infected vegetables stored at 7-8°C. *Y. pseudotuberculosis* grows well at low temperatures in liquid nutrient media, and multiplies in cold boiled tap water; it can also multiply at low temperatures in sterile and nonsterile soils and aqueous soil extracts. *Y. pseudotuberculosis* R forms revert readily to S forms after several passages at low temperatures. Microbial nutrition changes at low temperature to include inorganic and simpler organic compounds. Adhesive and invasive properties are much more pronounced in *Y. pseudotuberculosis* cultures grown in the cold; 100% mortality is achieved in mice infected with cold-grown *Y. pseudotuberculosis*. Growth in some substrate at a low temperature seems to be necessary to obtain bacteria capable of penetrating into pulmonary capillaries after intratracheal infection. *Y. enterocolitica* was also found to have similar but less pronounced psychrophilic properties. Enzymatic mechanisms giving *Yersinia* the ability to remain viable at low temperatures and to multiply in the environment are discussed. Enzymatic analysis revealed two protein fractions, containing hyaluronidase and neuraminidase, which were active either at high or low temperatures. *Y. pseudotuberculosis* was also found to have a "cold" and "hot" variant of esterase and catalase isozymes. When the bacteria were grown in cabbage juice, which contains 60 mg% uronic acids, hyaluronidase and neuraminidase activity increased appreciably at 8-10°C. These two enzymes may also act on pectins, which are present in large quantities in fruits and vegetables. It is postulated that in the course of evolution saprophytic microorganisms underwent mutations and selection, which produced the ability to infect the warm-blooded animals they encountered; however, the microorganisms did not lose their saprophytic properties. Such organisms may be designated as semiparasites or facultative parasites and the epidemics they cause as saprozoososes. It is also theorized that these psychrophilic properties may be typical for other pathogenic microorganisms. Determination of these properties should have an effect on epidemiology of certain infections and on prophylactic and antiepidemic measures. Fig. 1; references 14 (Russian).

I747-93077

GENETIC CONTROL AND MECHANISMS OF ACTIVATION OF IRRADIATION-STIMULATED LIPID SYNTHESIS IN CELLS OF CYANOBACTERIUM *Anacystis nidulans* R-2

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA. SERIYA 16. BIOLOGIYA in Russian No 4, Oct-Dec 84 (manuscript received 18 Apr 83) pp 48-51

TIFLOVA, O. A., POLUKHINA, L. Ye., GROSHEV V. V. and SHESTAKOV, S. V.

Abstract / Lipid synthesis was studied in the *Anacystis nidulans* wild type (R-2) and its propionate-resistant (Prp-7) mutant, in which lipid synthesis was not stimulated by UV or X-ray irradiation. Assimilation of acetate into lipids in this cyanobacterium is controlled by two enzymes, acetyl-CoA synthetase and acetate kinase. Only the latter was active in the Prp-7 mutant. Thus, the irradiation-stimulated incorporation of acetate into lipids was suppressed by the Prp mutation which blocked the reaction catalyzed by acetyl-CoA synthetase. The mechanism of activation of postirradiation synthesis of lipids was studied by comparing the effect of untreated and irradiated lipids in *A. nidulans* cells. Only the irradiated lipids stimulated lipid synthesis in the *A. nidulans* wild type, whereas lipid synthesis in the Prp-7 mutant was not stimulated by either of the exogenous lipids. This supports the theory that lipids synthesized after irradiation act as "starting effectors" in activating the synthesis of lipid fatty acids in irradiated cells. The increased synthesis of lipids may be related to radiation-induced damage to cell membranes; lipids whose synthesis is stimulated by radiation play a major role in repairing these damaged membranes. The absence of radiation-induced lipid synthesis in the mutant may be related to an altered cell membrane structure and alteration of the microenvironment of enzymes responsible for lipid synthesis. Figure 1; references: 6 Russian, 5 Western.

(267-9307)

COMPLEX METHOD FOR MEASURING FLUORESCENCE LIFETIME IN PICOSECOND RANGE WITH PHASE FLUOROMETER AND ITS USE FOR DETERMINING RATE OF EXCITATION ENERGY TRANSFER IN LIGHT-HARVESTING PIGMENT ANTENNA IN GREEN BACTERIA

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA. SERIYA 16. BIOLOGIYA in Russian No 4, Oct-Dec 84 (manuscript received 20 Dec 83) pp 56-59

FETISOVA, Z. G., KHARCHENKO, S. G., BLAGOVESHCHENSKIY, Yu. N. and BORISOV, A. Yu.

Abstract / A universal phase-fluorometric method, based on mixing of two fluorescence beams and analyzing two light components (short-lived and long-lived), was modified for measuring fluorescence lifetime of photosynthetic pigments *in vivo* in the picosecond range. A model experiment with sodium fluorescein solutions, the fluorescence of which was quenched with potassium

iodide, revealed good coincidence of experimental and theoretical data. The method was used to determine the rate of heterogeneous migration of energy from bacteriochlorophyll (BCh) c to BCh a in photochemically active pigment-protein complexes from the green bacterium *Chlorobium limicola* enriched with photochemical reaction centers P840. About 10% of BCh c molecules in the light-harvesting antenna did not participate in photosynthesis and were the source of the constant fluorescence component. The remaining 90% of BCh c molecules participated in transferring excitation energy to BCh a and were the source of the variable fluorescence component, the quantum yield and lifetime of which depended on the redox state of reaction centers P840; these BCh c molecules accomplished the energy transfer under conditions of light-unsaturated photosynthesis within 20-60 ps with an efficiency exceeding 95%. The constant fluorescence component was found to be heterogeneous, i.e., it could be irradiated with molecules with different lifetimes and quantum yields. References 4 (Western).

/267-9307/

UDC 579.22

#### NONSPECIFICITY OF BACTERIAL REDUCTION OF Cr(VI)

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 85 (manuscript received 13 Jul 84) pp 67-69

GVOZDYAK, P.I., MOGILEVICH, N.F., RYL'SKIY, A.F. and GRISHCHENKO, N.I., Institute of Colloid Chemistry and Water Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Eight different genera of Gram-positive and negative bacteria were tested for their ability to carry out reduction of Cr(VI) to Cr(III). The results demonstrated that in addition to *Pseudomonas* the other genera capable of similar enzymatic activity were *Achromobacter*, *Bacillus* and *Micrococcus*. These observations indicate that reduction of Cr(VI) is not a unique feature of *Pseudomonas* alone, and that the availability of other bacteria with similar metabolic potential expands the possibility of their utilization in water treatment and possibly in metallurgical enrichment biotechnology. References 15: 6 Russian, 9 Western.

/T840-12172/

UDC 578:577.152.3

NAD- AND NAD (P) GLYCOHYDROLASES OF MICROORGANISMS AND THEIR ROLE IN DEVELOPMENT OF PRODUCERS

Moscow USPEKHI SOVREMENNOY BIOLOGII in Russian Vol 99, No 1, Jan-Feb 85,  
pp 81-94

VORONINA, O.I., USSR Academy of Sciences, Institute of Bioorganic Chemistry  
imeni M.M. Shemyakin, Moscow

Abstract / A survey of the literature revealed characteristics of NADases of lower eukaryotic and prokaryotic microorganisms and their role in development of *N. crassa* and actinomycetes and toxins formed by the pathogenic bacteria. Microbic NAD- and NAD(P)ase from different sources differ in properties from one another and from enzymes of higher eukaryotes. Conjugality of activity of NAD- and NAD(P)ase activity and processes of morphogenesis and formation of secondary metabolites in *Neurospora crassa* and actinomycetes are shown. In the survey, NADase activity of bacterial toxins is examined as the sole (except bacteriophages) example of the existence of ADP-ribosylating activity in prokaryotes and information concerning this activity in bacterial toxins and phages are compared with that in higher eukaryotes. Information concerning diphtheria toxin is presented and discussed. The mechanism of toxic action of diphtheria toxin is discussed and the method of its penetration of the cell are described. Similarities and differences in the action of cholera toxin (from *Vibrio cholerae*) and toxin of the whooping cough pathogen (*Bordetella pertussis*) are described and discussed. References 90: 8 Russian, 82 Western.

/1869-2791/

UDC 615.285.7.015.4:579.63

MECHANISM OF BACTERIAL INACTIVATION BY CATIONIC SURFACTANTS

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKNOLOGIYA in Russian Vol 30, No 3,  
Mar 85 (manuscript received 10 Jul 84) pp 182-185

PAVLOVA, I.B. and SAMOYLENKO, I.I., All-Union Scientific Research Institute of Veterinary Sanitation; Scientific Research Institute of Epidemiology and Microbiology, USSR Academy of Medical Sciences, Moscow

Abstract / The mechanism of bacteriocidal action of the cationic surfactant dimethylbenzylammonium chloride was studied on exposure of *Staphylococcus aureus*, *Streptococcus faecium*, *Bacillus subtilis* and *Escherichia coli* to different concentrations of the agent and determinations of survival plots. The data showed that the surfactant was bacteriocidal for all the bacteria tested at a concentration of 0.0001%, but more efficient in the case of the Gram positives. Electron microscopy showed considerable damage and disarrangement of the cytoplasmic membrane, indicating that the killing mechanism

involved this organelle. It appears that cationic surfactants may constitute effective disinfectant preparations. Figures 2; references 9: 5 Russian, 4 Western.

/I864-12172/

UDC 579.8.04:615.33/.08

#### RAPID SPECTROTURBIDIMETRIC DETERMINATION OF MICROBIAL SENSITIVITY TO ANTIBIOTICS

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKHOLOGIYA in Russian Vol 30, No 3, Mar 85 (manuscript received 12 Nov 84) pp 208-212

IOSIPENKO, A.D., SHCHEGOLEV, S. Yu., SHENDEROV, B.A., IGNATOV, V.V. and NAVASHIN, S.M., Institute of Plant and Microbial Biochemistry and Physiology, USSR Academy of Sciences, Saratov; All-Union Scientific Research Institute of Antibiotics, Moscow

Abstract Standard spectroturbidimetric technology was applied to microbial sensitivity, using cultures of *Escherichia coli* M17 and *Staphylococcus aureus* 209P and 7 common antibiotics (chloramphenicol, streptomycin, gentamycin, carbenicillin, monomycin, tetracycline, oleandomycin). Analysis of the optical densities of the bacterial suspensions was shown to be a much more rapid and sensitive approach than standard gel diffusion methodology. The key advantage of this method was that a quantitative estimate of sensitivity was available in 4 h from determinations of the dry mass of whole cells. Figures 2; references 22: 17 Russian, 5 Western.

/I864-12172/

UDC 579.861.2:579.262:578.825/.579.252.55:615.33

#### EFFECTS OF ADENOVIRUSES ON ANTIBIOTIC SUSCEPTIBILITY OF STAPHYLOCOCCI

Moscow ANTIBIOTIKI I MEDITSINSKAYA BIOTEKHOLOGIYA in Russian Vol 30, No 2, Feb 85 (manuscript received 3 Apr 84) pp 113-115

TSIRKIN, R.S., Omsk Medical Institute imeni M.I. Kalinin

Abstract A number of strains of *Staphylococcus aureus* were incubated in a suspension with adenovirus 2 or 7 for 1 h at 37°C, then separated by centrifugation and tested for susceptibility to a number of antibiotics (penicillin, streptomycin, tetracycline, chloramphenicol, erythromycin, monomycin, oleandomycin, novobiocin, neomycin). Following incubation with the virus, microbial sensitivity was found to be enhanced in all cases and with all antibiotics. However, after the first subculture, reversion to original levels of sensitivity was seen. The effects of exposure to adenovirus were ascribed to undetermined changes in the cell wall of staphylococci, which rendered them

more susceptible to the antibiotics in question. Exposure of the staphylococci to culture fluid of Hep-2 cells, and specific adenoviral antigens, also enhanced sensitivity, but to a lesser extent than seen with the virions. Exposure of non-specific adenoviral antigens had virtually no effect. References 14 (Russian). [1862-12172]

## MILITARY MEDICINE

### NEW HOSPITAL COMPLEX FOR SEAMEN PROFILED

Tallinn RAHVA HAAL in Estonian 29 Dec 84 p 3

[Article by Arnold Trummer: "So that the Seaman May be Healthy"]

[Text] A seaman's career demands healthy and strong people. Medical personnel take care of their health. They have a doctor's say even at the time of career selection and before putting out to sea, and in a sailor's career this is often decisive. The medical servicing of seamen is managed by the Republic Central Shipping Hospital (chief surgeon Vello Subi). It takes care of some 50,000 people, almost half of them crew members. The medical personnel of the central hospital and its subunits also takes care of workers in shore installations, maintenance plants and enterprises, and often help must be extended to personnel not "in house." The new hospital complex has an inpatient facility with 275 beds, a polyclinic, appropriate diagnostic and therapy facilities, etc. Sailors in the fishing port are served by a substation of the central hospital's polyclinic; in the new port under construction there is a physician's office. Medical facilities are also located in the commercial port, the ship repair plant, in Parnu, in Loka, the "Majak" fishing kolkhoz, etc.

Heljut Kapral, the central hospital's deputy chief for therapy, said that particular attention is paid to ship's crews. A sailor always has little time because a ship will not wait. So everything is done to insure that patients receive prompt care and an immediate bed in the hospital if needed. The hospital has an experienced staff and modern equipment for obvious research and therapy.

In developing medical service the central hospital has received effective help from the "Eesti Kalatoostus" and "Eesti Merelaevandus" collectives, the ship repair plant, and fishery kolkhozes, to include construction, procurement of modern equipment, etc.

Many physicians, medics and nurses work aboard ships. Mother ships have small inpatient facilities. One might ask why these are needed, since only healthy people are allowed to sail by the strict medical commission. Nevertheless, there are cases of illness, and then help is nearby. Obtaining medical help in foreign ports brings about great losses in time and is also expensive. For example, in the case of a fisherman's illness the catch would have to be

interrupted, the nearest port would have to be hailed, a berth would have to be found with the help of a pilot, and the patient would have to be admitted to a hospital. All this would take a lot of time, while a day of fishing costs thousands of rubles. How expensive medical care is abroad becomes obvious considering that a single tooth filling costs nearly 300 valuta rubles. Since foreign ships usually do not carry physicians, Soviet medics have often had to help sailors on foreign ships, earning gratitude. In medical service our sailors have a great advantage over their foreign colleagues.

Currently a general diagnostic plan is being prepared in the central hospital, designed to predict illnesses. Sailors have already gone through the procedure, since otherwise they cannot go to sea. There are greater problems with shore personnel, but it is hoped that this important task will be solved smoothly.

"We have had much help from the small 'Nairi 2' computer we received four years ago," says Heljut Kapral. "Through its data base physicians have an immediate overview of illnesses among ship, shore, and agency personnel served by the hospital. The computer shows which illnesses are most frequent on ships, in enterprises, or elsewhere, and so appropriate countermeasures can be taken. We can also make prognoses as to what diseases are endangering us. The computer is like a health care map for us; all the measures have helped us to markedly reduce illnesses over the last years."

"Soon we will receive a new, modern SM 4 computer. We will enter into it the general survey data, and we want to use the computer also in the management system to raise therapy and administration to a new level."

The medical facility puts great emphasis on functional diagnosis and physiotherapy. At the initiative of director Raissa Litvinova hundreds of people are thoroughly examined in the functional therapy clinic in order to detect health problems. Thermal, electrical, hydro, mud, and inhalation therapy is available in the well-equipped physiotherapy clinic with its large processing capacity.

But what happens when, for instance, a person on board a ship thousands of miles away complains about severe heart pains and the ship's surgeon cannot provide the correct diagnosis? Here, too, help is available. On many ships the surgeons have small electrocardiography (EKG) machines that can transmit the data over radio-telephone. The data are received and reproduced on tape by a machine available to cardiologist Raissa Litvinova in the hospital on Tallinn's Paldiski street.

A specialist can immediately consult with the ship's surgeon and select the appropriate remedy. In this way physicians in the Mediterranean or some other areas have been assisted.

Services of medical personnel are most often needed by vessels plying African routes. They must often stay in ports located at the mouths of tropical rivers. It is hot there and there is a great danger of catching malaria.

For this reason the Central Shipping Hospital is the republic methodological center for tropical diseases, since ship surgeons are most often involved with them. In addition to modern therapeutic and diagnostic facilities, the hospital pressure chamber is of interest. Over three and a half years much effort was spent to activate it, but now the benefits are obvious. First, pressure therapy is very effective in the case of many diseases; second, the chamber serves to determine who is or is not suited for the interesting and even exciting diver's career. All of the republic's divers are attached to the hospital and are under constant medical supervision.

The good work of the hospital has been appropriately recognized. For last year's achievements it received the traveling red banner of the USSR Ministry of Health and the central committee of the agency trade union, and the hospital bears the title of a collective of communist labor.

As an experiment for better hospital work management, the brigade method of work was implemented. This was the first such step in medical institutions of the Baltic republics. It has proven itself especially among junior and mid-level medical personnel.

Heljut Kapral says, "If we were satisfied with where we are today, we can no longer justify our work. Our thought must be on tomorrow."

And this is indeed the case. Much work lies ahead for the hospital staff. With the construction of the new port in Tallinn, the number of personnel served by the hospital increases as well. A new polyclinic will soon be built at Kallavere, dental care and denture work will be offered locally. Shortly construction will also be under way on hospital grounds. An administrative building is being designed, and a new ward will be established to raise the number of beds to 500.

Work is in process on 10 pressing research problems recommended by the All-Union Problems Commission (among whose members is chief surgeon Vello Subi).

9240  
CSO: 1815/17

NONIONIZING ELECTROMAGNETIC RADIATION EFFECTS

UDC 577.39;599.323.4;621.375.8

EFFECTS OF LOW-INTENSITY MICROWAVE IRRADIATION OF ALBINO RATS ON BEHAVIOR

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 29 Nov 83) pp 114-116

RYNSKOV, V.V., Institute of Biophysics, USSR Academy of Sciences, Moscow

Abstract The behavioral effects of a 10 min low-intensity microwave irradiation (6 GHz, 200  $\mu$ W/cm<sup>2</sup>) were studied on male Wistar rats. To assess age effects, the studies were conducted at 1.5 month interval when the animals had shown a 100% weight gain. Evaluation of motor activity as a parameter of orienting and searching activity indicated that at the levels employed microwave irradiation enhanced mental alertness and attentiveness. The effects were more pronounced as the rats aged. These observations are in agreement with the generally held views that low-intensity microwaves act as CNS stimulants. Figures 1; references 7: 3 Russian, 4 Western.

1847-12172

PHARMACOLOGY AND TOXICOLOGY

UDC 612.467:615.31:547.466.37-08

COMPETITIVE INHIBITION OF MUSCIMOL BINDING TO GABA RECEPTOR BY TETRODOTOXIN

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 2, Mar-Apr 85  
(manuscript received 20 Feb 84) pp 38-40

KUZNETSOV, V.I., TONKIKH, A.K., KARANOVA, M.V. and SADYKOV, A.A., Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast

Abstract In view of the ability of tetrodotoxin (TDT) to induce Cl<sup>-</sup> release from Cl<sup>-</sup>loaded plasma membrane vesicles and the coupling of post-synaptic GABA receptors with Cl<sup>-</sup> channels, an assessment was made of the effects of TDT on the binding of the GABA analog muscimol to GABA receptors to further define the scope of action of TDT in the CNS. Studies with solubilized brain membranes obtained from rats showed that TDT inhibited the binding of tritiated muscimol to GABA receptors with an inhibition constant of  $3 \pm 0.6$  nm (i.e., TDT concentration which increased the dissociation constant 2-fold). Muscimol in turn competitively inhibited TDT binding to the receptors. The inhibition constant of TDT for the binding of GABA to GABA-receptors was of the same order of magnitude as for muscimol. Determination of binding levels showed that TDT binding sites in the membrane preparations had a 12-fold lower concentration than those for muscimol. These observations appear to expand the putative physiological role of TDT by demonstrating its binding to GABA-receptors. Figures 2; references 10: 2 Russian, 8 Western.  
/I855-12172/

UDC 612.82.014.467:577.175.827-08

EFFECTS OF TUFTSIN AND ITS DERIVATIVES ON BRAIN METABOLISM

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 2, Mar-Apr 85  
(manuscript received 13 Aug 84) pp 41-45

ROK'YA BEGAM and MAKSIMOVICH, Ya.B., Chair of Pharmacology, Odessa Medical Institute

Abstract In view of the recently reported CNS effects of tuftsin, the present study consists of further delineation of the physiological role of

tuftsin in the CNS by including comparative data for 3 tuftsin analogs: L-leu-L-lys-L-Pro-L-Arg (T-1), L-Thr-L-Ala-L-Val-L-Arg (T-2) and L-Thr-L-Lys-L-Pro-d-Arg (T-3). Evaluation of the effects of these compounds on the limbic and other formations in the brain of the Wistar rat demonstrated that they enhance tissue respiration, as indicated by an increase in the activities and concentrations of nicotinamide coenzymes and cytochrome c oxidase. Krebs cycle dehydrogenases also showed stimulation, indicating enhancement of oxidative and reductive steps in the different formations. The effects of tuftsin itself and of T-2 and T-1 was most pronounced in the limbic system, while T-3 induced essentially equivalent changes in the limbic and cortical formations. The data suggest that tuftsin and certain of its analogs may have potential usefulness in the clinical setting. References 16: 10 Russian, 1 Polish, 5 Western.

/I855-12172/

UDC 615.917:547.241/.015.4:612.82.015.348

EFFECTS OF DIMETHOXYDICHLOROVINYL PHOSPHATE AND FLUROSTIGMINE ON NIGROSTRIATAL LEVELS OF CYCLIC NUCLEOTIDES AND DOPAMINE

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 2, Mar-Apr 85  
(manuscript received 15 Feb 84) pp 46-48

GOLOVKO, A.I., KOROVKIN, B.F., KUTSENKO, S.A. and SAVATEYEV, N.V., Military Medical Academy imeni S.M. Kirov, Leningrad

Abstract To further define the mechanism of action of cholinesterase inhibitors, the effects of organophosphorus compounds on the metabolic activities of the nigrostriatal system were studied in rats as an anatomic site representing intimate interaction of cholinergic and dopaminergic mechanisms. Intraperitoneal administration of dimethoxydichlorovinyl phosphate (I) or of fluorostigmine (II) in doses of 0.6 or 0.9 LD<sub>50</sub> showed that severe toxicity led to elevation of cGMP in the acute phase with none or minimal depression of cAMP, while light or moderate degrees of toxicity had no telling effect on the cyclic nucleotides. Furthermore, dopamine was seen to accumulate in light and moderate degrees of toxicity, to be eventually replaced by evidence of depletion of this neurotransmitter. In severe toxicity, dopamine depletion was not preceded by accumulation. On balance, the data indicate that the toxic effects of I and II consist of an induced predominance of the cholinergic mechanisms over dopaminergic mechanisms via two different mechanisms. Within 30 min of injection this phenomenon is based on activation of the colinergic system, whereas after 24 h it is due to depression of the dopaminergic system in nonconvulsive levels of toxicity. References 8: 3 Russian, 5 Western.

/I855-12172/

UDC 615.225.2.015.44:612.111.014.2:576.311.342.2/.3

INTERACTION OF SELECTED VASOACTIVE AGENTS WITH PHOSPHOLIPID AND ERYTHROCYTE MEMBRANES

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 2, Mar-Apr 85  
(manuscript received 24 Apr 84) pp 72-76

PETROV, V.K., Chair of Pharmacology, Ryazan Medical Institute imeni I.P. Pavlov

Abstract Recent attention to membrane mechanisms in the mediation of drug action has led to the study of the interaction of several vasoactive agents (papaverine, theophylline, nicotinic acid, Apressin, adenosine, fosfaden sic, acetylcholine, Isoptin) with liposomal preparations and human and pigeon erythrocytic ghosts. Criteria of interaction relied on assessment of ATPase activity, changes in 1,8-ANS fluorescence and methylene blue adsorption, as well as osmotic stability of whole RBCs. Within the range of 10<sup>-3</sup> to 10<sup>-5</sup> M the agents in question were demonstrated to promote dye sorption, increase membrane permeability, diminish resistance to hypotonic and UV-induced hemolysis, after fluorescence of labeled membranes, etc. The data indicated that the changes were primarily due to nonspecific physicochemical interactions with the various components of the membranes leading to destabilization of membrane structure. The fact that pretreatment of RBCs with helium-neon laser irradiation (ca. 30-35 J) stabilized the membrane and increased its resistance to hemolysis was ascribed to laser-induced changes in lipid-protein interphases, leading to protein shielding and alterations in the ion channels. The observed changes were obtained with concentrations roughly attainable with drugs in the clinical situations in which they are applied. Figures 2; references 24: 18 Russian, 6 Western.

/1855-12172/

UDC 616.919:579.87.015.4:616.155.25

COMPARATIVE PHARMACOLOGICAL ANALYSIS OF BACTERIAL TOXIN- AND ADP-INDUCED PLATELET AGGREGATION

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 2, Mar-Apr 85  
(manuscript received 25 Oct 83) pp 82-85

BRILL', G.Ye. and SHENKMAN, B.Z., Chair of Pathological Physiology, Saratov Medical Institute

Abstract In view of the importance of platelet aggregation in the pathogenic mechanisms of various bacterial toxins, an analysis was conducted on the effects of various pharmacological agents on ADP-, *Shigella sonnei* endotoxin- and *Staphylococcus aureus* exotoxin-induced blood platelet aggregation. Using a test system involving rabbit thrombocytes, both the exotoxin and the endotoxin were seen to produce dose-related platelet aggregation. Acetylsalicylic acid and theophylline inhibited ADP-induced aggregation and

that induced by the toxins, but was less effective in the latter case. Monoiodoacetate exerted an inhibitory effect on ADP-mediated platelet aggregation, but enhanced that due to the bacterial toxins. Analysis of the individual inhibition patterns indicated that activation of arachidonic acid metabolism constitutes a key mechanism in ADP and endotoxin instigated platelet aggregation, but is essentially of secondary importance in staphylococcal exotoxin-mediated aggregation. While ADP-dependent aggregation was in fact an energy-dependent process, aggregation induced by the toxins was independent of glycolytic energy supplies. Figures 1; references 13: 3 Russian, 10 Western.

/I855-12172/

UDC 615.285.7.015.4:616.36-008.931-092.9

#### EFFECTS OF BENZONAL ON HEPATIC MONOOXYGENASES OF LABORATORY ANIMALS

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 2, Mar-Apr 85  
(manuscript received 24 Feb 84) pp 100-103

SAVATEYEV, N.V., LINYUCHEV, M.N., SERGEYEV, V.V., PANOV, B.P., OVSYANNIKOVA, L.M., AVAKYAN, A.Kh., KAGAN, Yu.S. and KOKSHAREVA, N.V., Military Medical Academy imeni S.M. Kirov, Leningrad; All-Union Scientific Research Institute of Hygiene and Pesticides, Polymer and Plastics Toxicology, Kiev

Abstract Outbred rats and mice were employed in a study to determine whether benzonal (benzobarbital) shares with phenobarbital the ability to activate microsomal enzymes, and therefore to enhance metabolic detoxication of pesticides. Hepatic studies involving determinations of enzymatic activities and monitoring of ESR signals indicated that benzonal (10-60 mg/kg intragastrically for 3-7 days, or 10-40 mg/kg i.p., once or three times) leads to marked intensification of the ESR signal of cytochrome P450, enhances lipid peroxidation, and increases the activities of carboxyl- and arylesterases. Concomitantly, benzonal administration counteracts hexenal-induced sleep. These findings demonstrate that benzonal is an effective inducer of monooxygenases and may be considered for use in enhancing metabolic detoxication of xenobiotics. Figures 2; references 7: 3 Russian, 4 Western.

/I855-12172/

PHYSIOLOGY

UDC 612.821.1/.3-08:612.821.6

SYSTEMS MECHANISMS OF EFFERENT SYNTHESIS STAGE IN PURPOSEFUL ACTS OF HUMAN BEHAVIOR

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 2, Feb 85  
(manuscript received 7 Mar 84) pp 53-60

AGAYAN, G.Ts., Moscow

Abstract / Study of formation of the efferent synthesis stage of purposeful human behavior, carried out with the use of models of maintenance of upright posture and sports shooting activities, showed that the efferent synthesis stage is one of the creative stages of purposeful human activity involving formation of a complex of mechanisms and processes consisting of parameters of a motor act and an analytically and afferent aspect involving environmental orientation. It was assumed that efferent synthesis is a fundamental stage of purposeful human behavior consisting of an hierarchic organization being formed with the aid of 2 types of reverse afferentation: from parameters of the result of an action and from parameters of effectors and the environment in which the result is formed. Figures 5; references 7 (Russian).  
I836-2791

UDC 612.821.1/.3-08

STUDY OF QUANTA OF PURPOSEFUL ACTIVITY OF WORKER PRODUCING ELECTRON-OPTICAL SYSTEMS

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 2, Feb 85  
(manuscript received 7 Mar 84) pp 60-63

MAMEDOV, A.M., AL'BER, V.O., AZAROV, A.V. and SEKISTOVA, S.V., Institute of Normal Physiology imeni P.K. Anokhin, USSR Academy of Medical Sciences, Moscow

Abstract / Study of somatoautonomic provision of quanta of production activity of electronic-optical systems assemblers included 60 vacuum molding machine operators ranging in age from 17 to 30 years. Telemetric observation showed clear-cut differences of physiological indicators at different stages of

quantum activity. Use of systems quantization of the workers' behavior revealed practically healthy workers, persons with functional, transitory changes of blood pressure, persons with pronounced hypertension and persons with pronounced hypotension. These findings were used to develop individual programs for the workers so they could eliminate or control the pathological conditions affecting them. References 6 (Russian).

/I836-2791/

UDC 612.014.464:577.337.014.49

QUANTITATIVE CRITERIA OF EVALUATING STATE OF FUNCTIONAL SYSTEM RESPONSIBLE FOR GASEOUS HOMEOSTATIS

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 2, Feb 85  
(manuscript received 7 Mar 84) pp 63-70

MEDELYANOVSKIY, A.N., GUS'KOV, S.V., KILINA, T.S., SELEZNEV, V.I. and STRELKOV, G.V., Institute of Normal Physiology imeni P.K. Anokhin, USSR Academy of Medical Sciences, Moscow

Abstract Foreign and domestic studies of the effect of laser irradiation on the functional state of the body reveal some prolonged physiological shifts in response to it but there are no reliable quantitative criteria for assessing the general bodily state in order to select an optimum regime of laser biostimulation. This situation prompted 52 examinations (19 control) of 18 volunteers of different age, sex and state of physical fitness involving 30-minute infra-red laser biostimulation of 5 sections of skin of the fingers with recording of various physiological indicators. It was found that the pulmonary respiration and gas exchange system is the most labile system during laser biostimulation, as has been reported in the literature. The general state of a subject's body under this effect changed significantly under the laser effect, according to the integral indicator of effectiveness; the change was associated, mainly, with changes of  $\Delta O_2$  percent values (deficit of oxygen concentration in the expired air). Mean group values of mean arterial pressure did not change statistically throughout the experiment, for all groups, and its absolute value showed an inverse relationship of the mean level of physical fitness of subjects of corresponding groups. Increase of integral indicator of effectiveness values after laser biostimulation in all 3 groups of subjects showed the inadequacy of the action regime selected. The zone of maximization of this indicator appeared earlier (20th minute of effect) in the groups made up of athletes and students while it appeared at the 30th minute of effect in older subjects with a lesser degree of physiological fitness. This may be due to the necessity of additional activation of metabolism by biostimulation in members of the older group and to the inadequacy of such action with regard to the young, healthier athletes. Figures 5; references 28: 17 Russian, 11 Western.

/I836-2791/

UDC (597:591.43) (08)

DETECTION OF ORGANOPHOSPHORUS INSECTICIDES IN WATER AND HYDROBIONTS

Kiev GIDROBIOLOGICHESKIY ZHURNAL in Russian Vol 20, No 6, Nov-Dec 84  
(manuscript received 17 Aug 81) pp 77-80

METELEV, V.V., All-Union Scientific Research Institute of Veterinary Sanitation, Moscow

Abstract A paper indicator method has been developed for the detection of organophosphorus insecticides in water and hydrobionts, with detection levels down to 0.02 to 0.1 mg/kg for fish and 0.002 to 0.01 mg/liter, depending on the insecticide. The basic approach consists of extraction with acetone from fish or with chloroform from water, a series of evaporation steps, and application to the indicator paper which is impregnated with bromthymol blue and acetylcholine. Following appropriate treatment and use of selected standards, the paper is sprayed with equine serum for development, yielding blue spots against a yellow background, from which the concentration can be determined. References 3: 2 Russian, 1 Western.

I870-12172

UDC 612.84+612.825

RESOLVING POWER OF HUMAN VISUAL CORTEX UNDER DIRECT ELECTRICAL STIMULATION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 281, No 4, Apr 85 (manuscript received 4 Dec 84) pp 1004-1006

KOMPANEYETS, Ye.B., Scientific Research Institute of Neurocybernetics, Rostov State University

Abstract Results of diagnostic tests performed after ventriculopuncture under local anesthesia were analyzed with one of the indicators of the functional state of the brain being the excitability of the cerebral cortex, determined by thresholds of rise of elementary visual sensations in response to different parameters of electrical stimulation of the cortex. Results of diagnostic studies of 14 sighted persons and 2 blind persons were presented and discussed. In both blind patients, direct electrical stimulation of the visual cortex caused visual sensations which possess some qualitative characteristics such as size, clarity and color. The clinical studies showed the high resolving capacity of the human visual cortex under direct electrical stimulation. References 12: 4 Russian, 8 Western.

I861-2791

EFFECT OF CHELATORS OF BIVALENT CATIONS ON RECEPTOR POTENTIAL OF FROG RETINAL RODS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 281, No 4, Apr 85 (manuscript received 22 Aug 84) pp 1000-1004

GOVARDOVSKIY, V.I. and BERMAN, A.L., Institute of Evolutionary Physiology and Biochemistry imeni I.M. Sechenov, USSR Academy of Sciences, Leningrad

Abstract Isolated retinas of frogs (*Rana ridibunda*), adapted to the dark, were washed on the receptor side with physiological solution containing (in mM) NaCl, 85; Na aspartate, 20; NaHCO<sub>3</sub>, 10; KCl, 2.5; MgSO<sub>4</sub>, 1; CaCl<sub>2</sub>, 1.0 or 0.1; glucose, 10; trias-HCl pH 7.5, 10. Through the solution was passed 95 percent O<sub>2</sub>+5 percent CO<sub>2</sub>. Ethylenediaminetetraacetate (EDTA) and ethyleneglycol bisaminoethyl tetraacetate (EGTA) were added to the solution in small volumes of concentrated (0.2 M) additives. Activity of Ca<sup>2+</sup> and Mg<sup>2+</sup> ions in solutions with EDTA and EGTA was calculated by affinity constants presented in a previous study /6/. The form of the late receptor potential (PRP) in a solution with low Ca<sup>2+</sup> and Mg<sup>2+</sup> activity undergoes typical changes indicating participation of another assumed mediator, cyclic guanosine monophosphate in its generation. Results showed clearly that light activation of phosphodiesterase and hydrolysis of it by cyclic guanosine monophosphate may be the starting link of a system of intracellular transmission of the optic signal as indicated by coincidence of the kinetics of the process providing the basis for generation of PRP at low concentrations of free Ca<sup>2+</sup> and Mg<sup>2+</sup> with the time course of phosphodiesterase activity. Blocking of the late receptor in the medium with EGTA may be caused by the increase of concentration of cyclic guanosine monophosphate, leading to complete opening of all light-regulated channels of the plasmatic membrane, which lose the capacity to be closed by light under these conditions. The great latency of responses to obvious stimuli preserved under these conditions is determined by the time necessary for light activating hydrolysis of excess cyclic guanosine monophosphate. Figures 3; references 12: 2 Russian, 10 Western.

/I861-2791/

PUBLIC HEALTH

TELEPHONIC CARDIAC DIAGNOSTICS

Moscow IZVESTIYA in Russian 25 Mar 85 p 1

[Article: "Long-Distance Diagnostics"]

[Text] IZVESTIYA correspondent G. Shipit'ko reports that a cardiology remote-controlled diagnostic center is in operation at the oblast clinical hospital in Omsk. The center can provide a rural physician with expert advice on a patient's heart function.

All that is required is to connect a simple device in the region of the patient's heart to a conventional telephone. The heart beat is picked up by sensitive instruments hundreds of kilometers away at the oblast hospital. Within a few minutes the cardiologist on duty can diagnose the patient's condition and advise treatment. And, if necessary, the patient can be flown to the center which has a communication line to the hospital's air center.

We telephoned the USSR Ministry of Health. We were told that there are already about 200 such centers in the country which are actually solving the problem of bringing patients from the "boon-docks" to well equipped medical facilities which have experienced specialists. This is particularly important for the RSFSR and its enormous expanses, diversified climate, and geography. The network of such centers is expanding. At the same time the centers are about to acquire qualitatively new technology, including computers, which will make it possible to automate remote-controlled diagnostics.

Just think of the seemingly front-page fact behind that development. Omsk, Siberia, and villages are separated from each other and the center by tens and hundreds of kilometers. And here the telephone, a conventional means of communication even for the backwoods, is transformed before our eyes into an instrument for auscultating the heart of each resident of the country and for helping people not only by dramatic vehicle and aircraft runs, but also with an everyday "Hello..."

6289

CSO: 1840/1859

## COMPUTERIZED X-RAY ANALYSIS

Moscow NEDELYA in Russian No 13, Mar 85 p 4

[Article by A. Korkin: "Machine Diagnosis"]

[Text] Leningrad medical personnel and machine designers have built a system for analyzing x-ray pictures.

As we know, radiologists can only visually evaluate the results of x-ray pictures. But the human eye can not always objectively analyze any one particular picture. Besides, while having concentrated his attention on one section of the x-ray, he could miss changes that have occurred in another region. Now, a computer technique developed at the All-Union Scientific-Research Institute of Electric Measurement Instruments has come to the aid of the medical personnel. Scientists have affixed an optical transformer similar to a camera to a computer complex. The camera takes the pictures and the computer analyzes the results.

We have before us a conventional x-ray picture. It is positioned on a special stand under which is a light source. A photoelectric sensor is placed above the stand.

"Every shift in the x-ray picture is transformed into an electrical signal which is recorded in the computer's memory," explains candidate of technical sciences M. Mikhaylov. The 'eye' of the machine catches the slightest deviation in the picture."

Hundreds of patients have already been examined with the aid of the system which has been installed at the Central Scientific-Research X-ray-Radiological Institute. This new method of x-ray analysis is opening up broad prospects. It will be of considerable assistance during the period of the general public prophylactic examination.

6289  
CSO: 1840/1859

UDC 614.2:362.17 (47+57)

SOCIALIST WAY OF LIFE AND PUBLIC HEALTH MAINTENANCE

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 1, Jan 85  
(manuscript received 24 Feb 84) pp 75-78

SHADIMETOV, Yu. (Tashkent)

Abstract / The Soviet socialist way of life is primarily a healthy way of life that is a necessary social condition for harmonic personality development, and health maintenance is the condition necessary for a successful, active life. In the Uzbek SSR, where malaria, trachoma, and rickets were prevalent and which had cholera and smallpox epidemics, health improved substantially within a single generation, as demonstrated by the lower morbidity, lower overall and childhood mortality, and longer lifespan. There are more than 2300 medical facilities, 1200 hospitals, 2000 public health centers and 1354 pharmacies. Current state medical expenditure per individual is 48 rubles, 90 kopecks, in comparison with 14 kopecks in 1913. The improvements are attributed to advances in agriculture. Sanitary conditions have also improved with 83% of collective and state farms having the proper hygienic and sanitary conditions. A lifestyle characterized by little physical activity and the population's nutritional habits have an increasingly greater effect on health and have produced the health problems of hypodynamia, obesity, and aging. Studies and hygienic assessments of air pollution in relation to pesticides and other chemicals were the first to be performed in the USSR. As a result, maximum allowable concentrations for toxic chemicals have been established, and biological plant protection methods have been introduced. Studies have shown that pollution of air by substances emitted by hydrolysis plants were harmful, especially in the case of children in poor health living 500-600 m from the pollution source. Additional measures are needed to reduce pollution and to establish sanitary protective zones. It is also necessary to improve nutrition, living conditions, and personal hygiene habits. Educating the public on matters of health is important, especially in the case of prenatal care. Resolutions of the CPSU Central Committee on measures to improve health care are discussed, in addition to other pronouncements on improving working and living conditions of the Soviet people. References 4 (Russian).  
/I747-9307/

## MEDICAL STUDENT SELECTION PROCESS EFFECTIVE

Moscow KOMSOMOL'SKAYA PRAVDA in Russian 1 Feb 85 p 2

Article by Professor Ye. Sokolov, rector of the Moscow Medical Stomatological Institute, and Professor Ye. Lil'in, doctor of biological sciences, in the column "VUZ: Predictions for the Future"

Abstract The selection of medical students was subjected to an objective and professional analysis of students entering medical schools. More than 200 students participated in this sociological and psychological study, which was devised by personnel of the Institute of General and Pedagogical Psychology, USSR Academy of Pedagogical Sciences. The tests measured intelligence, personal qualities and motivation. Accepted applicants had a greater psychological stability, were calmer, more composed and more self-disciplined, had a greater sense of duty, and were more sociable and less timid. These personality characteristics aided these students' acceptance, since they were valuable in enduring stress situations and retaining composure and self-control. The greater timidity and shyness of unsuccessful applicants had a negative effect, and their lack of self-confidence created the impression of lack of knowledge and inadequate preparation. Comparison of applicants to the stomatological faculty with general practitioners showed that the former preferred "technical" types of activity, were less sociable and less inclined toward self-analysis, but knew what they wanted. Applicants without prior medical experience regarded their work as the achievement of professional goals, whereas those with medical experience were less career-oriented and focused more on patients and good working relationships with medical personnel. These students were also less inclined to dominate and had greater confidence in their own authority. They were also more attached to their families and had a greater understanding of others. The results of these tests showed that the students entering medical institutes were those who should have been accepted; consequently, there is no need to change entrance exams or forms for selecting medical students. The reason why these excellent students do not all become excellent doctors lies perhaps in the teaching process.

266-9307

## PROGRESS IN PUBLIC HEALTH ADMINISTRATION

Tashkent SOVET UZBEKISTONI 9 Jan 85 p 3

English abstract from Uzbek language journal

Editorial report, "Mirror of Two Worlds"

Abstract The report contains figures on health and social progress in Uzbekistan and similar figures from the capitalist world.

-- There are 643,123 babies born in the Uzbek SSR every year, or 1,762 every day. In the years of the Soviet government, the average lifespan has doubled, the death rate has declined by five times, and the infant mortality rate has been cut by ten times in the republic.

-- Each year, 1,067,500 people rest and are treated at republic sanatoriums, pensions, and rest homes.

-- There are 1,155 children's polyclinics, dispensaries, and other facilities, and 73 children's hospitals with 8,317 physicians and 51,411 spaces for children's health care in the republic.

-- Presently the republic has 9,342 secondary schools, 534 trade and vocational schools, 247 tekhnikums, and 42 vuzes, with enrollments of 4,359,000 in schools and 207,500 in trade and vocational schools.

-- The state spends 171 rubles annually for every child in secondary school, 594 rubles for those in tekhnikums, and 960 rubles for those in vuzes.

-- There are now 1,102,400 children in preschool facilities. The state spends 428 rubles per child in kindergarten. Each year 739,800 children vacation in 2,274 pioneer camps.

-- Unemployment is completely eliminated in the republic which now has 4,697,600 workers and employees, a number increased by 141,700 annually.

-- Over 700 million rubles are spent each year on pensions and benefits for the republic's 1,928,000 elderly on pension.

## VENALITY OF PHYSICIANS AT ANDIZHAN MEDICAL INSTITUTE

Tashkent SOVET OZBEKISTANI 13 Jan 85 p 2 English language translation from Uzbek language article

### Editorial Report: Responsibility and Loyalty of Physicians

Abstract In this 1500-word article, R. Nurmuhamedov, rector of the Andizhan State Medical Institute, discusses the institute's renewed commitment to training mature, skilled, and highly responsible doctors. The opening of the institute's clinic was an important event in the Fergana Valley. In a short time, the clinic gained enormous respect. However, before long its reputation was substantially damaged due to the immoral practices of various doctors at the clinic who turned it into a source of personal income. They charged money for admitting patients, attending them, and dispensing medicine and drugs. In its struggle against them the institute has taken steps that resulted in arrests, punitive measures, and dismissals. Measures have been implemented to restore the clinic to its former glory. The number of spaces has been increased from 750 to 1,100, patient care has been improved, and strict supervision has been placed over medication schedules. Strict rules have been adopted to apply to those who violate the principle of providing equal care to all patients, and greater demands have been placed on the students receiving medical training at the institute. The editorial asserts that doctors who view medicine as a means of accumulating personal wealth are rarely encountered in Soviet society, and are far more typical of medical workers in capitalist countries like the United States where all medical care is contingent on money.

CSO: 1840/323E

## CONSTRUCTION OF ESTONIAN HOSPITAL DISCUSSED

Tallinn RAHVA HAAL in Estonian 23 Nov 84 p 2

Article by HELGI KALDMA: "At the Construction Site of Viljandi Central Hospital"

Text "Today was a decisive one in constructing the central hospital," said Cari Tamm on 25 October. A deputy director of the Rural Construction Trust, he is the representative of the main contractor on one of the largest sites of the construction ministry, and coordinates tasks there. "Namely, cables that we had waited for the entire summer and fall arrived. It was high time."

On that very day digging on cable trenches began. Still, it was too late, planning work on the site had been held up by the cable laying. Even roads could be laid outside the trench area. Nothing could be done for site preparation because of the missing cable. Work on the main site began hand in hand with cable laying. By the October holidays the cables were in the ground. However, the blacktop could not be laid. Had the cable arrived even 1 week earlier the site could have been in order before the first frost on 10 November.

Unfortunately, cable was by far not the only or last material on the missing list. There are no communication cables, and they can be emplaced only when the thermometer rises above freezing. There is no condenser device nor any electrical panels for the operation room, and their emplacement is time consuming. There is a lack of ventilators. There are requirements for 151 sets of fire hoses, not a single one has been received to date, etc.

"Although there is less than a month and half left until the construction is finished about a hundred different devices or materials have not yet been received from contractors," Cari Tamm stated. "Even the smallest of them will hinder work completion." Near the central hospital of Viljandi a boiler plant has been constructed, according to papers a separate project but actually a partner of the hospital. The main mission of the boiler plant is to deliver heat to the new hospital, and the heat was to arrive in September. This was thought to be necessary and possible. This did not come about. Even now the main and control panels are missing. The buildings are heated by a temporary boiler in the yard. It is good that the builders at least had, otherwise construction would be at a complete standstill....

Why then is the material supply by the contractors still in such a mess?

In the construction of rayon hospitals the local soviet is usually charged with acting as the contractor, receiving the allocated funds from the ministry of health. The supply of the Viljandi hospital's construction materials is thus in the hands of the rayon soviet's capital construction department.

"I said a couple of years ago that supplying such a major project exceeds the capacity of the three people of that department, no matter how capable they may be," said Andres Loigom, chief engineer of the immediate main contractor, the Viljandi mechanized construction team, a man with experiences gathered in building Polva and Voru hospitals.

"In Voru the problem in question was solved by having three or four of the most capable procurement specialists from local enterprises attached to the local soviet's capital construction department at the request of rayon organs," said Aare Kitsing, deputy ESSR minister of construction. "I have been preaching that to the Viljandi rayon leaders for months. It has done so much good that the "Ugala" procurer has been helping out for some time."

It is of utmost importance that a group of supply specialists goes through the supply problems and takes immediate measures to solve them.

Shortages of supplies and labor have been the two problems that have constantly overshadowed all other concerns in building the hospital. The labor problem, however, has been fairly successfully solved. This year builders of the Viljandi hospital have come from all over Estonia, from Haapsalu to Narva, from Valga to Tallinn. Many competitions of various kind were held and our republic's best plasterers, panellers, and painters were determined on several levels. Some competitions lasted a few days, some went on for weeks, and, most importantly from the construction standpoint, a lot of badly needed work was done. In addition to the competitors help has come from construction workers of sister firms and enterprises in the Viljandi rayon. There has been work for the people of Viljandi as well. Now, with the construction completion target date close at hand and the end of building obviously near, there is particular need for untrained helpers.

"A hundred from the Viljandi construction team, another 100 from all the other construction teams, and around 40 from subcontractors. Some 100 people have recently come daily from the rayon and the town," was Cari Tamm's summary of the labor force. This would be almost enough, but in the case of subcontractors it must be said again--there are fewer of them than are needed for work progression, and this has always been the case. On a day in late October the "Sevzaapelektrmontazh" trust was represented by seven people, "Termoizdeliya" by two, and "Promsvyazmontazh" by four. For normal work progression at least double that number of men would have been needed. The situation did not change 10 to 15 days later. As Aare Kitsing stated, the small "Sevzaapelektrmontazh" trust team has always been in the way of progress. They have gained courage to maneuver with word and deed due to the supplier's difficulties in delivering equipment.

On 15 November the volume of undone work was estimated at 530,000 rubles, 300,000 of which was to be done by the general contractors, including 200,000 rubles worth by the local construction firm, the main contractor.

In late January there was quite a remarkable meeting in the Viljandi administration building. Attendees included Peeter Palu, deputy chairman of the council of ministers, Harri Lumi, minister of construction, and Vaino Ratsep, minister of health. It was stated at the meeting that "if the correct tactics are selected, the basic construction work should be concluded by the October holidays." Although this goal was not reached, the words added to the competitive spirit among the builders. However, the socialist obligations spoke modestly of 28 December 1984 as the delivery date of the hospital. And this target must be strictly met.

Let Cari Tamm, representative of the chief contractor, give his judgment: "Furnishing of the 'A' wing began a couple of months ago. The corridor floors are basically undone. We will pour them of epoxy resin that is strong and looks good. We will do that job only after the beds are in the wards. The Haapsalu MEK /Mechanized Construction combine/ delegation has finished the basement of the same wing. A technical commission has inspected the communicable disease wing before the October holidays. Here, too, we left the hallway floors undone for the time being, so that the heavy furnishings will not damage them. With the kitchen facilities and the "C" wing as a whole we did not get as far before the October holidays as we had planned. Still, in a few days both the X-ray equipment and kitchen furnishing can begin to be installed.

Most work is to be done in the "E" wing. Compared to other buildings, work there is lagging considerably.

Apparently the end of the year will be quite stressful for the hospital builders. Success is guaranteed only by the coordinated work of the contractor, the main and subcontractors, and of all those concerned. But the task to provide the people in the area with a modern health facility is worth the effort.

9240

CSO: 1815/27

## HEAD PHYSICIAN HAILS RURAL HOSPITAL IN SOUTHEAST ESTONIA

Tallinn RAHVA HAAL in Estonian 24 Feb 85 p 2

[Article by Lembit Lehestik: "Beneath the Pines of Voru-Kubija"]

[Text] An entire citadel stands here now. The enormous central building which, viewed from afar, seems to touch the treetop branches directly is encircled in the snowy winter by such a sylvan quietude that the arriver feels as if he is in a convalescent home rather than a central rayon hospital. It is also quiet in the main building at noon. "We try to preserve the calm both indoors and outdoors. Patients from the city polyclinic come to us, too, but the doctors' offices are so spread out that no particular movement is observable in the building during the course of an entire day," says senior physician Hillar Kalda, giving an introduction to his rounds.

The senior physician could not refrain from saying a good word about the planners (with whom, incidentally, a work relation currently exists on behalf of new projects), who came to the Voru doctors from the Tartu branch of the "Estonian Project": "Tell us what has to be done and how!" Nor was a clear answer immediately forthcoming. The senior physician himself had to study architecture. Even the recorded experiences of world-famous hospital architects came into play. But the planners were patient, and a lot of things were done over again. The builders from the Land Construction Trust--with the Voru MEK [Mechanized Construction Combine] in the vanguard--were also forebearing.

This reminder perhaps helps us to understand how thoroughly the central hospital's everyday work rhythm changed with the introduction of the new building. Not to mention the changes in the health care arrangement of the entire rayon. The senior physician held that--with completion of the building and despite the colossal scope of the job--still only an introduction had been made to the next multiyear task. Because one of the basic goals in constructing the new hospital was and is greater care for the health of the people of the country.

Only the Rouge rural hospital, whose 25 rooms are used in the interest of social maintenance, remained originally. Renunciation of the remaining small hospitals gave rise to complaints in Vorumaa at the outset. It was not believed that a large new hospital would be able to support all the medical and especially the nursing concerns just as steadfastly. For a year and a half at political conferences and other meetings, health care leaders with the senior physician in

the vanguard had to issue counterstatements to the numerous doubts and to do thorough explanatory work. Nor have the doubts disappeared at present. But as in Kubija, many a thing has changed in the rural centers in the course of time. Outpatient clinics and a doctor's assistant center were established in the rooms of former small hospitals. They are presently in all the larger rural centers: Misso, Vastseliina, Varstu, Haanja, Osula, Meremae, Lasva. Even though repairs and remodeling are not finished everywhere, it causes no great concern: independent economic units have helped to put in order and equip all these buildings or rooms. With the support of an independent economic unit, work has begun on a dental treatment office in Kuldre and Vaimela. What is just as important, however: all the rural doctor districts have received a vehicle for themselves, the final one now in Lasva before the elections. For some unforeseen reason, the Meremae region was left without a physician, but a new doctor is being found for it. Elsewhere, there is a doctor or at least an experienced doctor's assistant (the latter in Meremae, too). Experienced local nurses came to help them from the small hospitals. Consequently, one of the central hospital's basic current concerns--where to get additional manpower--has been completely solved in the rural districts.

This concern did not spring up overnight. As early as 1982 it was decided at a joint session of the rayon's executive committee and the Health Ministry's council that--in view of the new central hospital's requirements--doctors would be directed to Voru. This agreement has been adhered to. The republic's health care leaders help to see to it that medical school graduates from Voru return to their home region. Because the central hospital, unfortunately, cannot send grant-aided students to study. But those capable of being directed are certainly sought after and prepared. For years already, 15 to 18 girls in each graduating class at Voru's high school number one have studied the basics of medicine in accordance with a special program. They undergo training at the central hospital. Last year a dozen graduates from Voru were directed to medical school.

And yet what the medical schools have given back is relatively meager so far. Graduates of the Kohtla-Jarve medical school are therefore directed to the Voru central hospital. But most of them soon return to their home region. Like other nonnatives of Voru, they also have trouble getting an apartment. The housing shortage was heard as a fundamental concern at the rayon's executive committee session last year, when development of the health care network was under consideration. Until the living quarters are overhauled, the central hospital must direct even more youths away from Voru to study.

Senior physician Hillar Kalda stressed that the other basic task after the ribbon cutting was no less important: the main emphasis again on the provision of medical care. "Construction matters did not allow us to delve into the basic work in the previous manner. It is very difficult as a senior physician to get reaccustomed to the everyday work rhythm." Despite being at his present post for a number of years, Hillar Kalda has developed into a skilled and appreciated health care leader. The level of treatment at Voru central hospital can be labeled in various ways. The Voru years are to be recalled by several district directors. A candidate's degree thesis has been defended twice in Voru, a doctoral thesis once. The prerequisites for fruitful scientific work are also in the new conditions for treatment. Physician/chemist Viivi Ruga is currently

running functional diagnostic tests for a candidate's degree thesis. Several departments are in a good position: functional diagnostics headed by Vyatsheslav Seim, rehabilitation therapy headed by Kalli Paaver. The laboratory operates at top level under the direction of Heino Ersi. The pediatric ward led by Heli Grunberg and Ruth Kipper functions at a good rhythm; learning and free-time activity proceed smoothly there under the supervision of skilled teacher Maria Luige.

The senior physician spoke about the forthcoming elections in summary. As a member of the rayon's executive committee, he has come to speak about the rayon's health care problems on several occasions. Therapist Niina Shentropova, moderator of the permanent health care commission, is in most cases the cospeaker. Mail Punman, the senior physician's medical assistant, was elected to the Voru town council. At the central hospital there are other persons competent in ambassadorial activity. It is thus suitable to solve several health care problems in the rayon with the support of representatives. The buses run irregularly between the central hospital and the town. The Voru transportation base hopes for help soon from the "Ikarus" articulated buses to be obtained, but then an eye must be kept on the bus service. A great health care undertaking lies ahead: the provision of general health care for the people of the entire rayon.

12327  
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UDC 614.27:615.2

NATIONAL CONTROLLERS -- ACTIVE ASSISTANTS IN ORGANIZATION OF ADEQUATE PHARMACY SUPPLIES FOR POPULATION

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 4, Apr 85 (manuscript received 10 Nov 84) pp 22-24

CHICHUK, N.Ye., Main Pharmacy Administration, Belorussian SSR Ministry of Health

/Abstract/ Development of various pharmaceutical and drug supply services in the Belorussian SSR have seen significant advances including the establishment of 116 new pharmacies over the last decade, material improvements at 349 existing pharmacies, and the opening of 123 pharmaceutical consultation offices. However, the system of national controllers has revealed shortcomings which bear attention and correction. For example, although the last decade has seen a 70.5% rise in drug supply and in other pharmaceutical commodities and 510 new drugs have been introduced into medical practice, the available resources have not always been properly used and dispensed, particularly when it comes to meeting the legitimate needs of veterans of the Great Patriotic War. Inadequate attention has been accorded to poor administrative measures and supply practices, and in many cases inadequate control measures have been exercised over dispensing and prescription practices. Physicians have all too often prescribed medication without adequate examination of patients and failed to keep proper records. In the Benshekovich Central Rayon Pharmacy in Vitebsk Oblast veterans have encountered problems in having their prescriptions fulfilled at first request. In addition, at many pharmacies in hospital and educational institutions inadequate control measures led to retention of drugs past their expiration dates, while supplies of other drugs in short-supply and high-demand category have not been restocked. A colloquium of the Belorussian SSR Ministry of Health addressed these problems in November 1984; as a result, a number of concrete measures have been taken to improve pharmacy services. These include adequate monitoring of inventories and instillation of a sense of greater responsibility in the pharmacy and medical personnel. Other measures are designed to expand information services, improve the quality of personnel, and provide refrigerators and metal safes for outlying pharmacies for storekeeping of perishable items.

/I888-12172/

ROLE OF PERMANENT ONCOPULMONOLOGICAL COMMISSION IN EARLY DIAGNOSIS OF LUNG CANCER

Minsk ZDRAVOKHRANENIYE BELORUSSII in Russian No 4, Apr 85 (manuscript received 26 Sep 84) pp 20-22

ZHAKOV, I.G., YAS'KEVICH, L.S., GOLUBOVICH, I.A., MURAVSKAYA, G.V., GUTMAN, Z.M., ZHARKOV, V.V., DEMIDCHIK, Yu.Ye. and GAVRIL'CHIK, A.I., Belorussian Scientific Research Institute of Oncology and Medical Radiology

Abstract An analysis was conducted on the status of lung cancer in Belorussia in the last decade (1973-1983), to analyze the relatively low incidence of radical resection in 1983. The incidence of resection was found to vary widely from oblast to oblast, with the highest incidence of such treatment seen in the Gomel Oblast (13.9%), and the lowest in the Grodno Oblast (4.2%). In Belorussia on the whole, it became apparent that a fifth of the patients are diagnosed in the IVth stage of disease, while 19.7% of patients, diagnosed with stage II disease, refuse surgery, and surgery is contraindicated in 35.4% of the patients. These facts point to the need for active involvement of the Permanent Oncopulmonary Commissions in Belorussia in the early diagnosis and treatment programs, in order to overcome as persistent obstacles to surgery such as age. At leading centers, 20% of such surgical procedures are now carried out on patients over 60 years of age. The morbidity and outcome statistics can be further improved by more rigorous detection programs.

I888-121727

## BRIEFS

MOBILE NOISE LABORATORY--Medical workers are now helping manufacturers to determine the working order and fitness for further operation of Osh factory and plant equipment. The regional center now has a mobile noise-and-vibration laboratory that monitors the work of factory machinery and automated systems and their effects on the environment and human health. The work safety and epidemiological service has for a long time checked vibration standards in shops. Previously, it was necessary to transport cumbersome equipment which took much time to set up. The mobile laboratory can now take measurements and process the results in a reasonable amount of time. These results can then be used to recommend the replacement of obsolete equipment or the installation of systems to dampen noise and vibration and therefore protect workers from excessively high decibel levels. Improvement of the materials and technology used by the regional work safety/epidemiological station has made it possible for medical specialists to take part in introducing new forms and methods of protecting the health of workers. Agreements will be made with plants and factories to maintain continuous control over equipment noise and vibration. Posts will be set up in shops to monitor these effects and their work will be coordinated by the mobile laboratory. /By N. Pletnev/ /Text/ /Frunze SOVETSKAYA KIRGIZIYA in Russian 9 Apr 85 p 27 12261

NEW ESTONIAN SPA--Pylvalskiy Rayon--A festive event on the eve of elections was the opening in Vyarsk of the first series of rest and convalescence homes. A beautiful three-story building contains 96 beds and a dining room. The rooms are designed for two people and are comfortably and beautifully furnished. Vyarsk's mudbaths and waters have a good healing effect for radiculitis, rheumatism and other illnesses. /By E. Narusk/ /Tallinn SOVETSKAYA ESTONIYA in Russian 21 Feb 85 p 17 12261

NEW BIOLOCATIONAL LABORATORY--"To see the invisible" was the title to an article published in the 12 February issue of PRAVDA which reported on the biolocational laboratory at the USSR Ministry of Railways Central Clinical Hospital No 1 and the problems involved in the introduction and application of new diagnostic methods of computer echotomography and telethermography. The research conducted using these methods is absolutely harmless and may be used for all patients without restriction. In a public statement, V. Sibilev, the director of the Chief Medical and Sanitary Bureau of the USSR Ministry of Railways, stated that the problem of creating a biolocational laboratory with the necessary new equipment is now being resolved. The laboratory's

work procedure and a list of its staff members have been established. Next year, the Central Clinical Hospital No 1 will conduct an international symposium on computer echotomorphography and telethermography in the diagnosis of various diseases. There will also continue research on the development of new diagnostic methods and medical specialists for other such hospitals will also be trained. Unfortunately, PRAVDA has still not received word from the USSR Ministry of Health on whether other such laboratories are going to be created everywhere. Moscow MOSKOVSKAYA PRAVDA in Russian 14 Apr 85 p 27  
12261

CSO: 1840/298

RADIATION BIOLOGY

UDC 575.24:575.591:576.353

EFFECT OF CELLULAR RESPIRATION INHIBITORS ON FORMATION OF STRUCTURAL MUTATIONS  
IN HUMAN LYMPHOCYTES, IRRADIATED AT VARIOUS STAGES OF MITOTIC CYCLE

Moscow GENETIKA in Russian Vol 21, No 2, Feb 85 (manuscript received  
24 Feb 84) pp 252-261

LUCHNIK, N.V., PORYADKOVA, N.A. and IZMMAYLOVA, N.N., Scientific Research  
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Abstract Study of the effect of sodium cyanide, sodium fluoride and mono-idoacetic acid on formation of structural mutations in human lymphocytes involved irradiation of human lymphocytes with gamma-quanta of  $^{60}\text{Co}$  after 0, 10, 20, 35, 45, 48 or 49.5 hours after incubation with addition of one of the inhibitors into the medium for 2.5 hours, immediately after irradiation, similar treatment of non-irradiated cells and analysis of chromosomal aberrations observed in the metaphase of the first meiosis. All of the inhibitors increased the number of chromatid aberrations when used without irradiation. These substances were found not to be mutagens in the narrow sense of the word since the increase of frequency of occurrence of aberrations involved suppression of reparative processes which increased the probability of rise of spontaneous changes (so-called pseudomutagenesis). The chemicals increased the frequency of occurrence of aberrations caused by irradiation in 2 periods of the mitotic cycle, the  $G_1$  stage and  $G_2$  stage. Reparative processes occurring in these periods requires both DNA synthesis and energy. Figures 3; references 21: 9 Russian, 12 Western.

1825-2791

UDC 577.391;591.111

INDUCTIVE-RESONANCE ENERGY TRANSFER BETWEEN CHROMOPHORES OR IRRADIATED AND CONTROL ERYTHROCYTE GHOSTS

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 3 Oct 83) pp 12-15

FOMENKO, B.S., DLIMBETOVA, G.K. and AKOYEV, I.G., Institute of Biological Physics, USSR Academy of Sciences, Pushchino

Abstract In order to ascertain whether irradiation can affect distances between various membrane components, a study was made of the effects of gamma-irradiation of rat erythrocyte ghosts labeled at different sites with chromophores. The effects of irradiation (250 Gy, Co-60) on membrane structure were assessed in terms of inductive-resonance energy transfer between the following chromophore pairs: tryptophan--pyrene, pyrene--1,8-anilino-naphthalenesulfonic acid (ANS), diphenylhexatriene (DPHT)--ethidium, and ANS--ethidium. In the tryptophan--pyrene, tryptophan--ANS and pyrene--ANS pairs the effects were analyzed in terms of fluorescent quenching of the first chromophore by the second, while in the latter two pairs from ethidium fluorescent intensity following excitation of ANS. Analysis of the likely site of membrane localization of the chromophores and the fact that energy transfer in the tryptophan--ANS and ANS--ethidium pairs was not affected by irradiation, but was diminished in the case of the pyrene--ANS, DPHT--ethidium and tryptophan--pyrene pairs, indicated that gamma-irradiation in the dose specified resulted in a reduction in the thickness of the hydrophobic component of the bilayer lipid membrane. Figures 3; references 10: 3 Russian, 7 Western.

1847-12172

UDC 577.391;591.81;591.133

IMMEDIATE EFFECTS OF RAT GAMMA-IRRADIATION ON LIPID TRANSPORT FUNCTION OF HEPATOCYTE CYTOSOL

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 5 Dec 83) pp 16-19

KOLOMIYTSEVA, I.K., POTEKHINA, N.I., KAZNACHEYEV, Yu.S. and KUZIN, A.M., Institute of Biological Physics, USSR Academy of Sciences, Pushchino

Abstract In view of the similarities in the perturbation of lipid transport functions induced by neoplastic transformation and irradiation, the effects of gamma-irradiation (12 Gy. Cs-137, 4 Gy/min) on rat hepatocyte cytosol were monitored in this respect to determine factors that may account for such functional alterations and possibly indicate a carcinogenetic mechanism. The specific study dealt with cholesterol and phospholipid transfer between <sup>14</sup>C-labeled microsomes and mitochondria; using combinations of cytosol and

organelle fractions from the livers of irradiated and control rats. The cholesterol transport function of the cytosol derived from the irradiated rats was seen to increase within an hour of irradiation. However, six-fold purified lipid-transfer proteins from the control rats showed equivalent degrees of transfer efficiency with organelles derived from control and irradiated rats. The data were interpreted to indicate minimal-level changes in the carrier proteins, with changes in lipid synthesis exerting a more profound effect on net transport. Irradiation induced an increase in cholesterol synthesis while concomitantly depressing the synthesis of cholesterol esters and phosphatidylcholine. Figures 1; references 12: 1 Ukrainian, 4 Russian, 6 Western.

/I847-12172/

UDC 577.391.547

EFFECTS OF ALPHA-IRRADIATION ON RADIOSUSCEPTIBLE AND SUPERRESISTANT ESCHERICHIA COLI

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 27 Jan 84) pp 20-23

AMIRATAYEV, K.G., KRASAVIN, Ye.A., KOZUBEK, S. and NYAMSAMBUU, A., Joint Institute of Nuclear Research, Dubna

[Abstract] Studies were conducted on the susceptibility of wild type, Rec A<sup>-</sup>, and super-resistant E. coli to inactivating doses of gamma- and alpha-irradiation, to determine the relationship of susceptibility ( $D_{50}^{-1}$ ) to linear energy transfer (L). Analysis of dose-survival plots for the wild type and the mutant strains demonstrated that, in isogenic E. coli mutants, the response to gamma- and alpha-irradiation differs, depending on whether the DNA repair mechanisms are impaired or whether the repair system functions more efficiently. In the case of rec A<sup>-</sup> mutants, alpha-irradiation diminishes radiosensitivity, whereas in the super-resistant mutants susceptibility to the effects of alpha-irradiation increases. As a result, with alpha-radiation the ratio of  $D_{50}$  for the different mutant cells to  $D_{50}$  for wild cells approached the same value, indicating that alpha-particles tended to diminish the radio-susceptibility differences among the E. coli strains, suggesting a genetic basis for the  $D_{50}^{-1}$ -L relationship. The ratio figures showed considerably greater disparity in the case of gamma-radiation, again confirming the underlying genetic basis of susceptibility to radiation. Figures 2; references 10: 8 Russian, 2 Western.

/I847-12172/

UDC 577.391;591.81

PARAMETER EVALUATION OF PROBABILITY MODEL OF RADIATION CELL INACTIVATION FROM SURVIVAL PLOTS

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 5 Mar 84) pp 29-32

AMIRTAYEV, K.G., KOROGODIN, V.I. and LOBACHEVSKIY, P.N., Laboratory of Nuclear Problems, Joint Institute of Nuclear Research, Dubna

Abstract / An empirical approximation was devised for the determination of the  $\alpha$  and  $b$  parameters in Kapul'tsevich's probability model of radiation-induced cell inactivation, where  $\alpha$  is the probability of 'failure' (i.e., failure to divide of irradiated cell or its progeny) per one elementary lesion, and  $b$  represents the probability of one elementary lesion per unit radiation dose [Kapul'tsevich, Yu. G., Quantitative Aspects of Cellular Radiation Injury, Moscow, Atomizdat, 1978 (in Russian)]. Analysis of experimental cell inactivation data showed that  $\alpha$  can be obtained from the relationship  $\alpha = 0.4n^{-0.6} + 0.1n^{-0.15}$  where  $n$  is the extrapolation number or exponent in the empirical equation  $S = 1 - (1 - e^{-D/D_c})^n$  ( $S$  = survival rate,  $D$  = irradiation dose,  $n$  = extrapolation number,  $D_c$  = mean lethal dose). The parameter  $b$  can be obtained from the relationship  $b = b_c (n) D_c^{-1}$ , where  $b_c = 1 + 0.148 \ln(n)$ . Figures 2; references 5: 4 Russian, 1 Western.

1847-121727

UDC 577.391;591.01

PARAMETER DETERMINATION FROM NOMOGRAMS IN PROBABILITY MODEL OF RADIOSensitivity

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 2 Jan 84) pp 33-36

FAYSI, Ch., Joint Institute of Nuclear Research

Abstract / Nomograms were developed for the easy determination of the  $\alpha$  and  $b$  parameters of the Kapul'tsevich probability model of radiation-mediated cell inactivation, where  $\alpha$  is the probability of 'failure' of an irradiated cell or its progeny to divide per one elementary lesion, and  $b$  is the probability of one elementary lesion per unit radiation dose [Kapul'tsevich, Yu. G., Quantitative Aspects of Cellular Radiation Injury, Moscow, 1978 (in Russian)]. In the approach proposed,  $\alpha$  was derived from plots relating  $D$  (irradiation dose) and  $c$  (degree of survival) via nomograms, with  $b$  determined from the relationship  $b = a/D$  ( $a$  - average number of lesions). Figures 3; references 5: 4 Russian, 1 Western.

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UDC 577.391;582.282.23

RECOVERY OF YEAST CELLS FROM COMBINED EFFECTS OF HYPERTHERMIA AND IONIZING RADIATION

Moscow RADIOPHYSICS in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 28 May 84) pp 37-42

GLAZUNOV, A.V. and BOREYKO, A.V., Joint Institute of Nuclear Research, Dubna

Abstract An analysis was conducted on the recovery of yeast cells (*Saccharomyces cerevisiae*) from the combined effects of hyperthermia and gamma-irradiation. The cells showed recovery following exposure to 50°C for 5-10 min and 15 min gamma-irradiation at 0°C (Cs-137, ca. 35 Gy/min), with the sequence of exposure having no effect. However, hyperthermia in combination with gamma-irradiation increased radiosensitivity of the cells as measured from survival data on nutrient (YEFD) agar with 1.5 M KCl. The synergistic effects of both lethal factors were diminished by preincubation of the cells at 28°C for 6 h in water prior to inoculation of the agar plates. The data were interpreted to indicate that in addition to lesions induced by radiation and heat, additional lethal lesions were induced by the combination of these two factors. Incubation of the exposed cells in water at 28°C led to the repair of the radiation and heat-induced lesions, and probably of some of the 'combined' lesions. Nevertheless, it appears that one factor has no appreciable effect on the repair of damage induced by the other factor.

Figures 2; references 8: 5 Russian, 3 Western.

1847-12172

UDC 577.391;576.8

QUANTITATIVE EVALUATION OF SYNERGISM

Moscow RADIOPHYSICS in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 6 Dec 83) pp 43-46

LYSTSOV, V.N. and SAMOYLENKO, I.I., Moscow Institute of Engineering and Physics

Abstract A theoretical analysis is presented of the synergistic, additive and antagonistic effects of various factors on biological systems, with the derivation of a coefficient of interaction  $\omega$ , such that  $\omega > 1$  corresponds to synergism,  $\omega < 1$  corresponds to antagonism, and  $\omega = 1$  corresponds to an additive effect. In practical trials with *Staphylococcus aureus*, and gamma-irradiation, treatment with hydrogen peroxide, exposure to heat or a combination of factors, the results were subjected to mathematical analysis. Evaluation of the effects of these factors on colony formation demonstrated that in the case of gamma-irradiation and hydrogen peroxide treatment  $\omega = 1.25 \pm 0.10$ , indicating a synergistic effect of this combination. The situation was more complex with gamma-irradiation and heat treatment in that

marked antagonism was seen with low doses of the factors involved, but on prolonged heat treatment was replaced by a synergistic type of interaction. The molecular mechanism responsible for this type of a relationship remains enigmatic. Figures 2; references 6: 3 Russian, 3 Western.

/I847-12172/

UDC 577.391;577.16

THERAPEUTIC ACTION OF PLANT OILS AND UBIQUINONE-9 IN RATS WITH RADIATION SICKNESS

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 20 Jan 84) pp 53-58

KOLOMIYTSEVA, I.K., NOVOSELOVA, Ye.G., POTEKHINA, N.I., OBOL'NIKOVA, Ye.A., SAMOKHVALOV, G.I., MARKEVICH, G.I. and KUZIN, A.M., Institute of Biological Physics, USSR Academy of Sciences, Pushchino; Scientific Industrial "Vitaminy" Association, Moscow

Abstract In view of the effects of ionizing radiation on lipid metabolism, experiments were designed to test the effectiveness of soybean oil and other oils alone and in combination with ubiquinone-9 in the treatment of rats with radiation sickness. Wistar rats exposed to 7.3 Gy gamma irradiation were treated before or after exposure with 150 mg/kg of soybean oil or 100-200 mg/kg ubiquinone-9. When administered 3 h before irradiation both agents improved the survival figures; administered immediately after irradiation, a less pronounced positive effect was still obtained. The effectiveness of ubiquinone-9 was somewhat greater than that of soybean oil, with the dose-modifying factor for ubiquinone-9 in plant oil equal to 1.08. Similar trials with CBA x C57BL mice showed that soybean oil was similarly effective in protecting the mice, but that in this species ubiquinone-9, as well as ubiquinone-1, were ineffective. It may be that the soybean oil (and also corn oil in rats) induced lipid synthesis favored postradiation recovery. Figures 3; references 23: 15 Russian, 8 Western.

/I847-12172/

UDC 577.391

ACUTE TOXICITY AND RADIOPROTECTIVE EFFICACY OF INTRAMUSCULAR GAMMAPHOS IN MICE

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 20 Mar 81) pp 59-62

KUNA, P., Medical Scientific Research Institute imeni E.J. Pyrkyne, Hradec Kralove, Czechoslovakia

Abstract Outbred and inbred mice were utilized in a study on the toxicity and radioprotective efficacy of intramuscular gammaphos, in order to determine

whether this route of administration is as effective as the intraperitoneal route. On intraperitoneal administration, acute toxicity (LD<sub>50/48</sub>) was determined at 790 mg/kg; with intramuscular injection, at 862 mg/kg. Intramuscular administration of 100 mg/kg of gammaphos was as effective as 150 mg/kg of cystamine in reducing mortality to zero (vs. a control mortality of 80%) in animals irradiated with a 7 Gy dose from a Co-60 source. Furthermore, increasing the gammaphos dosage to 200 or 300 mg/kg provided even greater radioprotection against greater gamma-irradiation. The intramuscular route was thus demonstrated to be suitable for the administration of gammaphos for radioprotective purposes, and carried somewhat less risk of toxic side effects. References 13: 1 Czech, 4 Russian, 8 Western.

/1847-12172/

UDC 577.391;591.133

#### OPTIMAL COMBINATIONS OF AET, ATP AND SEROTONIN IN TERMS OF MINIMAL TOXICITY

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 30 Sep 83) pp 63-68

BENOVA, D.K. and P'ETEV, I.Kh., Institute of Roentgenology and Radiobiology, Medical Academy, Sofia, Bulgaria

Abstract Quantitative assessment was conducted on optimal combination of AET, ATP and serotonin for maximum radioprotective effectiveness and minimal toxicity. The study involved mathematical evaluation of double and triple intraperitoneal combinations in C57B mice. The toxicity data showed that ATP/AET combinations were less toxic than ATP/serotonin or AET/serotonin combinations. In ternary combinations high concentrations of ATP diminished the overall toxicity, with the following combination showing the least toxicity: 803-812 mg/kg ATP + 215-218 mg/kg AET + 14-27 mg/kg serotonin. Figures 3; references 19: 1 Bulgarian, 1 Czech, 13 Russian, 4 Western.

/1847-12172/

UDC 577.391;577.7;591.111

#### RADIOPROTECTIVE EFFECTS OF ACUTE HYPOXIA IN NEUTRON-IRRADIATED DOGS

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 23 Apr 84) pp 74-77

KALMYKOVA, G.I., NIKANOROVA, N.G. and SVERDLOV, A.G., Leningrad Institute of Nuclear Physics imeni B.P. Konstantinov, USSR Academy of Sciences, Gatchina

Abstract Outbred dogs were employed in a study designed to assess radioprotective effectiveness of acute hypoxia on the outcome to irradiation by fast neutrons (0.85 MeV, 80% neutrons, 0.3 Gy/min, 4 Gy total dose). For 5-6 min

before irradiation, during, and for 4-5 min thereafter experimental animals were maintained on a gas mixture of 90% nitrogen and 10% oxygen, while control animals breathed air. During the following 50 h monitoring period 7 of the 9 control animals died, while only 2 of the 10 experimental animals succumbed. Acute hypoxia was thus shown to be protective in neutron irradiation, and the similarity to its effectiveness in gamma-irradiation suggest that the gamma-ray component of neutron irradiation makes a significant contribution to the lesions induced by fast neutrons. Figures 2; references 15: 11 Russian, 4 Western.

/I847-12172/

UDC 577.391;612.419;599.323.4

EFFECTS OF PRETREATMENT WITH CHRONIC IRRADIATION AND  $\alpha$ -TOCOPHEROL ON GAMMA-RAY INDUCED CHROMOSOMAL ABERRATIONS IN MOUSE BONE MARROW

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 2 Sep 83) pp 78-81

ALIYEV, A.A., AKHUNDOV, V.Yu., ALEKPEROV, U.K., GAMZAYEVA, I.A., ASADOVA, A.I., SHEKHTMAN, A.B. and GABAY, N.S., Institute of Botany imeni V.L. Komarov, Azerbaijan SSR Academy of Sciences, Baku

/Abstract/ CBA mice were employed in a study designed to further define the radioprotective role of low-dose chronic gamma-irradiation in the prevention of chromosomal abnormalities. In one group the animals were subjected to gamma-irradiation (Co-60, 33.7-35.8 mA/kg) for 8 h/day for 70 days to reach a cumulative dose of 2.75 Gy, and then challenged with a single 2.98 Gy x-irradiation. Low-dose gamma-irradiation alone had no effect on the incidence of bone marrow chromosomal aberrations, and protected the animals from x-irradiation. X-irradiation of previously unirradiated animals yielded a peak incidence of chromosomal abnormalities within 18-24 h (36.4  $\pm$  1.45%), whereas the incidence in pretreated animals was 23.19  $\pm$  1.3%. In animals pretreated with  $\alpha$ -tocopherol (0.06 mg/20 g, per os, for 14 days before x-irradiation) the incidence was 16.24  $\pm$  0.9%, and in animals subjected to a combination pretreatment of low-dose gamma-radiation and  $\alpha$ -tocopherol the incidence was 13.70  $\pm$  1.07%. The effects of low-dose gamma-irradiation and  $\alpha$ -tocopherol were thus seen to be additive in protecting the genetic apparatus from nonlethal doses of ionizing radiation. Figures 2; references 16: 12 Russian, 4 Western.

/I847-12172/

RADIORESISTANCE IN CENTRAL ASIAN TORTOISE

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 10 Mar 83) pp 92-94

TURDYYEV, A.A., BOGDANOVA-BEREZOVSKAYA, I.G. and DVORNIKOVA, L.I., Institute of Zoology and Parasitology, Uzbek SSR Academy of Sciences, Tashkent

Abstract Season-related studies were conducted on the phenomenal radio resistance of the Central Asian tortoise (*Testudo horsfieldii*), in order to obtain greater understanding of the factors that determine this physiological uniqueness. Test animals were gamma-irradiation from a Co-60 source with dosages ranging from 12.9 to 25.8 Ci/kg in the spring, summer, fall and winter. Using Pearson's  $\chi^2$ -distribution coefficient calculations of the mean lethal dose for the season yielded 16.33 Ci/kg for winter, 10.94 Ci/kg for spring, 7.1 Ci/kg for summer, and 19.71 Ci/kg for fall. The animals were thus seen to be most susceptible to radiation damage in the spring and summer. Correlation with histological and hematological studies showed that animals irradiated in spring and summer succumbed as a result of damage to the GI and the hematopoietic systems, whereas animals that died as a result of irradiation during the fall and winter season did so because of depletion of hepatic glycogen stores. Figures 1; references 5: 4 Russian, 1 Western.

[T847-12172]

STIMULATORY EFFECTS OF AMINOETHYLISOTHIURONIUM ON IMMUNE RESPONSE AND INTERFERON PRODUCTION IN IRRADIATED MICE

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 29 Nov 83) pp 95-98

ZHELEZNIKOVA, G.F., OGURTSOV, R.P. and STEPANOV, A.N., Central Scientific Research Roentgen Radiological Institute, USSR Ministry of Health, Leningrad

Abstract To further define the broad biological activity of aminoethylisothiuronium (AET), its effects on interferon production and antibody formation were studied in outbred mice. When administered in a 150 mg/kg dose, i.p., AET enhanced the number of splenic antibody forming cells in response to SRBC challenge in 4 Gy x-irradiated animals, but did not enhance the humoral antibody titers. Serum derived from AET-treated animals, which contained elevated interferon levels on the order of 40-160 U/ml, had a similar effect in irradiated mice. AET injected into CC57Br mice that had been irradiated and used as recipients for skin transplants from CBA mice promoted a more vigorous rejection reaction. In addition, AET was also effective in enhancing NDV-induced interferon production in mice subjected to

4, 5 or 6 Gy irradiation, but not in the case of infection with Sendai virus. The suggestion is advanced that since AET is too toxic for clinical use as a radioprotective agent, it might be investigated further as a clinically useful interferon inducer. References 13: 8 Russian, 5 Western.  
I847-121727

UDC 577.391;616.006

#### RADIOMODIFYING EFFECTS OF XANTHOBIN ON TRANSPLANTABLE TUMORS

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 23 Jan 84) pp 112-114

VOLCHKOV, V.A., MIKHAYLOVA, N.Ya. and KLIMOVICH, V.B., Central Scientific Research Roentgen-Radiological Institute, USSR Ministry of Health, Leningrad

Abstract Xanthobin (8-bromocaffein) has been shown to exert radiosensitizing action on murine leukosis La cells. To assess its general applicability in this respect, additional transplantable tumors were tested for their susceptibility to radiosensitization by xanthobin. Studies on (CBA x C57Bl)F<sub>1</sub> with implants of bronchial adenocarcinoma RL-67 subjected to 40 Gy x-irradiation over a 4 day period demonstrated that i.p. administration of 100 mg/kg of xanthobin enhanced tumor killing. Similar effectiveness was observed in outbred mice injected with Ehrlich's ascitic carcinoma cells, subjected to 3-10 Gy x-irradiation and similarly treated with xanthobin. The radiosensitizing effects of xanthobin, noting in particular its efficacy with low level radiation, may be due to its inhibition of postradiation repair mechanisms. Figures 2; references 4 (Russian).  
I847-121727

UDC 577.391;591.512

#### CAT BEHAVIOR AFTER GAMMA-IRRADIATION OF HEAD: INDUCED PLEASURE TEST

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 22 Mar 84) pp 116-119

DAVYDOV, B.I., USHAKOV, I.B. and RAZGOVOROV, B.L., Institute of Biophysics, USSR Academy of Sciences, Moscow

Abstract The effects of head gamma-irradiation (1.29 Ci/kg, Co-60, 0.86-0.99 mA/kg) on the emotional status of cats was studied in a model of the valerian oil-induced pleasure test. The study was conducted with 17 cats showing a definite pleasure response to exposure to ethanol tincture of valerian. During the first 10-15 min of irradiation the previous level of responsiveness to valerian oil was retained by the cats. However, the pleasure response showed marked inhibition 1-2 h after irradiation. These

observations were interpreted to indicate that within 10-15 min of head irradiation the emotional status of the animals was enhanced due to excitation of the CNS, with subsequent transition to a tranquilizing effect of gamma-irradiation on the limbic system. References 16: 9 Russian, 7 Western.

/T847-12172/

UDC 577.391;539.163;591.111

ROLE OF LOW MOLECULAR WEIGHT SERUM COMPONENTS IN PLUTONIUM BIOACTIVITY

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 7 May 84) pp 134-136

SHVYDKO, N.S. and POPOV, D.K., Leningrad Scientific Research Institute of Radiation Hygiene, RSFSR Ministry of Health

Abstract Ion-exchange technology was employed to assess the binding of Pu(IV) to various small molecular weight components in the normal serum. In terms of binding efficiency the various components ranked as follows: bicarbonate > citrate > phosphate > amino acids. These observations suggest that Pu-bicarbonate complexes play an important role in the equilibrium levels of Pu-transferrin complexes and the net balance of Pu deposition in body tissues and renal elimination. References 5: 2 Russian, 3 Western.

/T847-12172/

UDC 577.391;591.813;547.963.3

INITIATION OF UNSCHEDULED SYNTHESIS AT DNA SITES ASSOCIATED WITH NUCLEAR MATRIX OF IRRADIATED HEPATOMA CELLS

Moscow RADIOBIOLOGIYA in Russian Vol 25, No 1, Jan-Feb 85 (manuscript received 18 Oct 84) pp 137-138

GAZIYEV, A.I., BEZLEPKIN, V.G., MALINOVSKIY, Yu.Yu. and VEL'CHOVSI, V., Institute of Biological Physics, USSR Academy of Sciences, Pushchino

Abstract Comparative studies were conducted on the rate of DNA synthesis of nuclear matrix-associated DNA and non-associated sites in response to UV (30 J/m<sup>2</sup>, 254 nm, 0.6 J/m<sup>2</sup> /sec) or gamma- (100 Gy, Co-60, 52.7 Gy/min) irradiated Zajdela [sic] hepatoma cells. Within 1.5-5 min of irradiation, unscheduled synthesis for matrix-associated DNA was greater than for the rest of the nuclear DNA, with subsequent diminution in the difference between these two DNA entities. The hydroxyurea-resistant DNA synthesis observed within 1.5-5 min of irradiation was interpreted as representing unscheduled DNA synthesis at matrix sites, presumably due to greater accessibility of the associated regions of DNA to repair enzymes. DNA-polymerase-alpha, which functions both in DNA synthesis and repair, has been previously demonstrated to be firmly bound to the nuclear matrix. References 4 (Western).

/T847-12172/

RADIATION MUTAGENESIS UNDER ACTION OF DNA SYNTHESIS INHIBITOR (SENSITIZATION AND ANTIMUTAGENESIS)

Moscow GENETIKA in Russian Vol 21, No 1, Jan 85 (manuscript received 28 Dec 83; after final revision 22 Mar 84) pp 69-73

SERGIYEVSKAYA, S.P., DUBININA, L.G. and KURASOVA, Z.I., Institute of General Genetics, USSR Academy of Sciences imeni N.I. Vavilov, Moscow

Abstract/ Effects of DNA synthesis inhibitor on genetic effects of radiation were seen in action of 5-fluorodesoxyuridine on the frequency of chromosome rearrangements in irradiated *Vicia Raba* cells. In past experiments inhibitors of DNA synthesis caused an increase in radiation effects (sensitization). Modification of radiation mutagenesis induced in  $G_1$  and  $G_2$  phases of the cell cycle was studied in cells of *Crepis capillaris*. 1- $\beta$ -D-arabinofuranosylcytosine (ara-C), a nucleoside analogue of 2'-desoxycytidine, was used as the inhibitor of DNA synthesis. Ara-C has both antitumor and anti-viral properties. Depending on the phase and duration of the cell cycle, duration of ara-C action relative to radiation exposure and the action of inhibitor, new forms of interaction between radiation and inhibitor were observed. Ara-C was shown to possess a sensitizing effect as well as antimutagenic action. The modification of radiation effect is connected with the effect of the inhibitor on the reparative synthesis of DNA. References 17: 4 Russian, 13 Western.

/1824-7813/

CONFERENCES

UDC 615.2.03:616.17:061.3(47+57)"1984"

ALL-UNION SEMINAR ON 'CURRENT PROBLEMS IN CARDIOVASCULAR PHARMACOLOGY'

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 2, Mar-Apr 85  
p 124

KOVALEV, G.V., professor, Leningrad

Abstract An All-Union Seminar on Young Scientists on the topic of "Current Problems in Cardiovascular Pharmacology" was held in Volgograd on October 1-8, 1984. The meeting was attended by 130 participants from 10 republics and 55 cities in the USSR, and included 2 young pharmacologists from Bulgaria. The 22 lectures at the conference were complemented by two round tables, one dealing with "New Methodological Aspects of Screening and Studying Antihypertensive Agents", involving A.V. Val'dman, G.V. Kovalev, O.S. Medvedev and I.N. Tyurenkov (Moscow, Volgograd), the other on "Centralization of Electrocardiographic Diagnosis" covered the Kovyl' telemetric system and included a film presentation organized by A.G. Konevskiy and K.V. Gavrikov. In addition, a competition was held among the poster presentations, which totaled 30 in number. The first prize was awarded to three presentations from Moscow and Volgograd: "Erythrocytes as Drug Delivery Vehicles to Damaged Vascular Sites" (M.D. Smirnov, G.P. Samokhin, V.R. Muzykantov and S.P. Domogatskiy, All-Union Cardiological Center, Moscow), "Effects of GABA and Fenibut on Cerebral Circulation in Experimental Pathology" (T.N. Shcherbakov and V.I. Petrov, Chair of Pharmacology, Volgograd Medical Institute), and "Use of Beta-Blocker, Calcium Antagonists and their Combination in Stress-Induced Angina Pectoris" (A. Yu. Romakov and A.M. Sagirov, All-Union Cardiological Center, Moscow).

1855-12172

8TH ALL-UNION SYMPOSIUM STRUCTURE AND FUNCTIONS OF CELL NUCLEUS

Moscow USPEKHI SOVREMENNOY BIOLOGII in Russian Vol 99, No 1, Jan-Feb 85  
pp 155-158

BUL'DYAYEVA, T.V.

Abstract Approximately 200 specialists from different cities in the USSR participated in the symposium held in Pushchino from 15-18 May. The program included presentation of 46 papers and 186 exhibits on the subjects: structure of nuclei and chromosomes, ultrastructure of chromosomes and chromatin, organization of chromatin, nuclear proteins and enzymes, shell structure of the cell nucleus, organization of the genome of eukaryotes, the nuclear shell and nuclear-cytoplasmic relationships and replication and transcription. Findings reported in the papers are presented for each of the subject areas covered.

1869-2791

## MISCELLANEOUS

### WORK ON NATURAL BIOCIDES FOR ANTI-FOULING PAINTS

Moscow NTR: PROBLEMY I RESHENIYA No 8, 17-29 Apr 85 p 6

[Article by Salop, M., engineer]

[Excerpt] Marine fouling of the bottoms of vessels is a major problem for shipping. At the Ukrainian Academy of Sciences' Institute of Biology of the Southern Seas in Sevastopol', there is a whole research division which is working on this problem.

Doctor of Biological Sciences Yu. A. Gorbenko, head of a department, held a metal plate that looked quite ordinary. "This is a specimen for testing," said Yuriy Aleksandrovich. "We'll see what happens with it after spending some weeks in sea water."

These days it is considered a rule that mollusks can be driven off only by a paint that is toxic for them, applied to the surface of a vessel. There are already many different compositions of anti-fouling toxic paints. The principle of their action is the same in all cases: the layer of sea water that comes into contact with the vessel becomes saturated with chemical compounds of copper, mercury, lead, zinc, arsenic and other elements that are deadly for everything alive.

Considering that the volume of world shipping doubles every 10 years, it becomes clear: the ecological harmlessness of anti-fouling paints used today will become questionable, to say the least. There is a growing problem of how to develop new means of protection which do not pollute the seas.

Associates of a laboratory asked a simple question: why don't many marine organisms which do not have special organs for protection become encrusted? It was found that the role of protection for them is played by products of vital activity -- metabolites -- which they secrete. The idea occurred of using these substances for protecting ships against fouling organisms. Metabolites will drive away larva of fouling organisms, while remaining harmless for other marine organisms.

"This vial you see contains metabolites," continued Yuriy Aleksandrovich. "But before they can be used against fouling, a number of technological

questions must be resolved. What method of extracting metabolites is most economical? How are they to be obtained on a commercial scale? In what way are they to be used most effectively: in paint compounds, or releasing them in certain portions from the hull of a vessel? The research is continuing."

FTD/SNAP  
CSO: 1840/1878

END